Experiment Center 2
Manual

Version 2.3

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SMI
SensoMotoric Instruments

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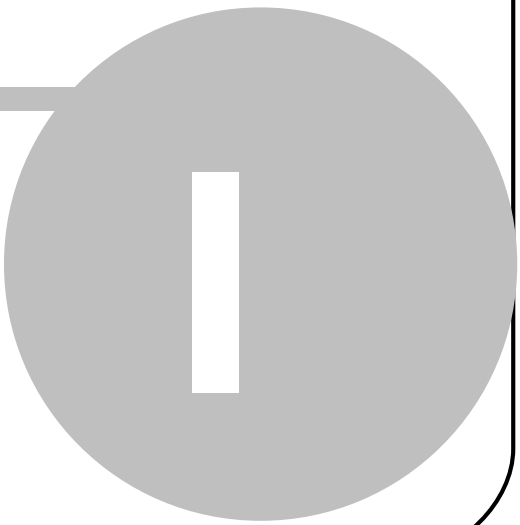
Introduction

Chapter



1 Introduction

Congratulations on your purchase of SMI Experiment Center™ 2.3, a software designed to make gaze tracking experiments and visual stimuli creation a snap. SMI Experiment Center™ 2.3 and the accompanying SMI iView X™ system and the SMI BeGaze™ 2.3 software are designed particularly for researchers working in the fields of reading research, psychology, neurology, cognitive neuroscience, marketing research and usability testing.

SMI Experiment Center™ 2.3 the SMI iView X™ system and the SMI BeGaze™ 2.3 software build up a powerful platform to record and analyze gaze tracking data. This platform supports a broad range of studies ranging from usability testing and market research to psychology and physiological experiments. This platform is ideal for evaluating interactive media such as web sites, software along with print and online advertising.

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How to Read this Document

Chapter

2 How to Read this Document

This manual is designed to serve both as online help and as printed documentation of Experiment Center 2.3.

The software version covered in this document is: 2.3

You can use this manual in one of these ways:

- Read through the chapters pertaining to particular functions to get background information before using the program.
- Consult the manual as a reference document to find out particular information. You can find a topic either by consulting the table of contents (at the front of the manual), or the index (at the end).

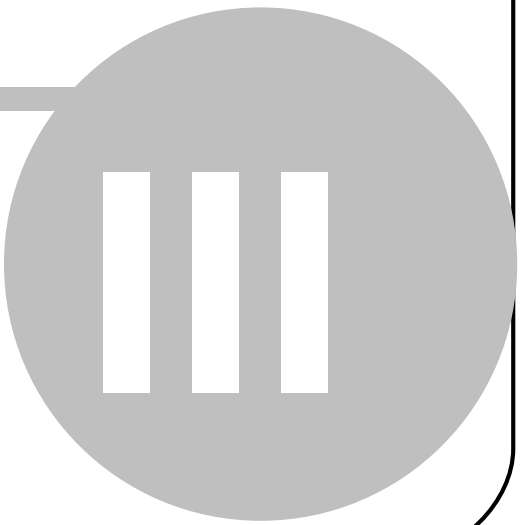
All the information in this manual can also be accessed through the program. Press [F1] to open the Online Help on a menu item or on the element that has currently the input focus or that is selected.

It is probably not necessary to read all the chapters consecutively as there was an effort to make every chapter complete within itself. This means that some phrases may recur. You may leaf through the chapters to look for the topics that interest you. The link references included in the text as well as the table of contents and the index should help you find your way through this document.


You can locate information fast by using the Online Help's table of contents, index or full text search features.

Important Notice

Chapter



3 Important Notice

Experiment Responsibility

Make sure the presented visual stimuli do not harm or injure your subjects. SensoMotoric Instruments GmbH is in no way responsible for the experiments you develop, execute, and analyze. Do not offend against your subject's cultural background, age, psychological condition, or similar.

Photosensitive Epilepsy

Some people may have epileptic seizures triggered by light flashes or patterns. This may occur while presented successive pictures or video material, even if they have never had a seizure before.

Supervise your subjects during experiments. Stop immediately and consult a doctor if a subject has the following or similar symptoms:

- Involuntary movements
- Disorientation
- Convulsions
- Loss of awareness
- Altered vision

Overview

Chapter

4 Overview

4.1 General Product Information

4.1.1 Product Variants

SMI Experiment Center™ 2.3 is available in the following **product variants**

- Experiment Center 2 Light

  full featured without screen recording

- Experiment Center 2 Professional

  full featured including screenrecording

- additional Reading Package

  automatic AOI generation for reading experiments

- additional Observation Package

  adds user video and user audio recording

4.1.2 Dongle Protection and License Update

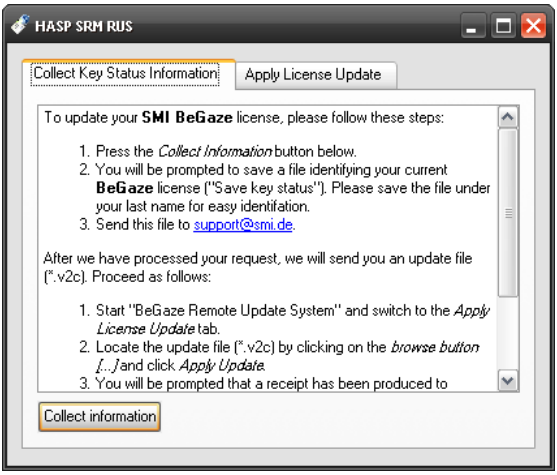
Experiment Center 2.3 is dongle-protected and requires a license. If you want to update your Experiment Center 2.3 version, please contact the SMI sales department 111 to obtain a new license.

Collect license information

The SMI sales department will need your current license information:

1. From the Windows™ start menu, select **Programs: SMI: Experiment Suite 360° Remote Update Utility**.

2. In the **Collect Key Status Information** tab of the Remote Update Utility, click the **Collect information** button. This will acquire the current license information which is currently stored on the dongle device.



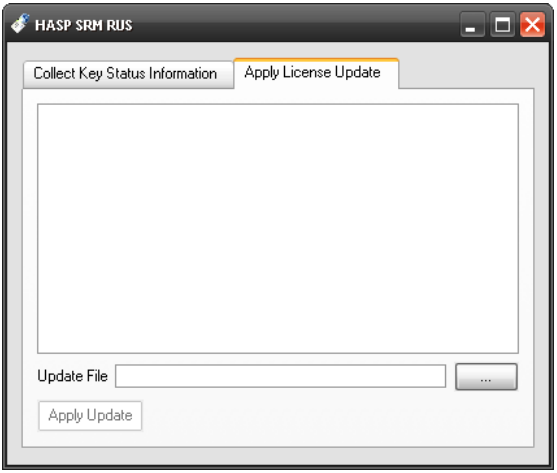
3. You will be prompted to save a file identifying your current Experiment Center 2.3 license ("Save key status"). Please save the file under your last name for easy identification.
4. Send this file to sales@smi.de.

   You will receive a new license key from SMI.

Update license

After you have purchased your new license key (*.v2c file format), update your license as follows:

1. From the Windows™ start menu, select **Programs: SMI: Experiment Suite 360° Remote Update Utility**.
2. Switch to the **Apply License Update tab**.



Ensure that only the Experiment Center 2.3 dongle is plugged. Remove all other dongles from the PC.

3. Locate the update file (*.v2c) by clicking on the browse button ... and click **Apply Update**. This will write the updated license information to the dongle device.
4. You will be prompted that a receipt has been produced to confirm the update. Please send this receipt file to support@smi.de.
5. Close the **Remote Update Utility** and start Experiment Center 2.3.

Type and status of your licenses are stored on the dongle device, not on the PC on which Experiment Center 2.3 is installed. With the license update procedure, the dongle is updated. That means, that you can run Experiment Center 2.3 on any PC when the dongle is plugged in.

4.2 Features and Benefits

Applications

SMI Experiment Center™ 2.3 is optimized for certain **applications**, e.g.

- Psychological experiments based on videos and/or pictures (grouped, randomized, dwell time trigger AOI)
- Market Research analyzing advertisements (TV Spots, printed Advertisements ...)
- Reading Studies with automatic AOI generation for words, sentences and paragraphs
- Website analysis of full length web sites with scroll compensation, recording of user events (mouse clicks, key presses) and background screen recording
- Software usability with screen recording, including gaze position, mouse cursor and user event overlays

Features and Benefits

SMI Experiment Center™ 2.3 is an easy to operate experiment creation, planning and experiment execution environment. It is complemented by the SMI iView X™ for gaze tracking data acquisition and SMI BeGaze™ 2.3 for gaze tracking data analysis.

Experiment Center 2.3 delivers experiment design and experiment control in a user-friendly design, which enables you to handle the Experiment Center 2.3 functionality out of the box. Experiment Center 2.3 allows you to prepare and execute gaze tracking experiments with the following features

- A single user interface for managing various functions, including stimulus preview, live gaze monitoring, and precision timing
- Online guide for optimal subject placement in front of the remote eye tracker
- Integrated calibration including support for animated calibration targets and immediate validation of calibration quality.

- Text, images, video, full length web sites, or interactive programs with screen recording can be displayed to each subject step by step while the subject's gaze position is monitored and gaze tracking data is recorded.
- Integrated User (Webcam) and Audio recording (requires observation package license)
- A randomization/scrambling group function to allow groups of stimuli to be presented in a non-determined order and randomization of presentation time.
- A lock/unlock function to prevent accidental invalidation of experiments already used in a recording.
- All visual stimuli can be displayed for 500 milliseconds or longer while maintaining a high timer accuracy.
- A dry run function for test scenario evaluation – without calibration and recording.
- An integrated data storage to allow the acquired data to be analyzed in the BeGaze 2.3 software.
- Presenting the next stimulus can also be triggered by looking into a predefined area of the subject ("AOI dwell time trigger")
- TTL Trigger on LPT1 port

Experiment Center 2.3 runs on a standard PC and connects to the iView X system. The iView X system in turn operates an attached gaze tracking device. Currently supported eye tracking interfaces are

- RED4
- Hi-Speed 500Hz, 1250Hz
- fMRI-LR, fMRI-SV, and the MEG gaze tracking systems.

You can run Experiment Center 2.3 directly on the iView X system. Alternatively, Experiment Center 2.3 runs on a dedicated stimulus PC which is connected to the iView X system using a network link.

Double monitor operation is also supported. You can present visual stimuli on one monitor while doing experiment control on a second

monitor.

4.3 Basic Operation

Experiment Center 2.3 is optimized for a typical gaze tracking experiment work flow:

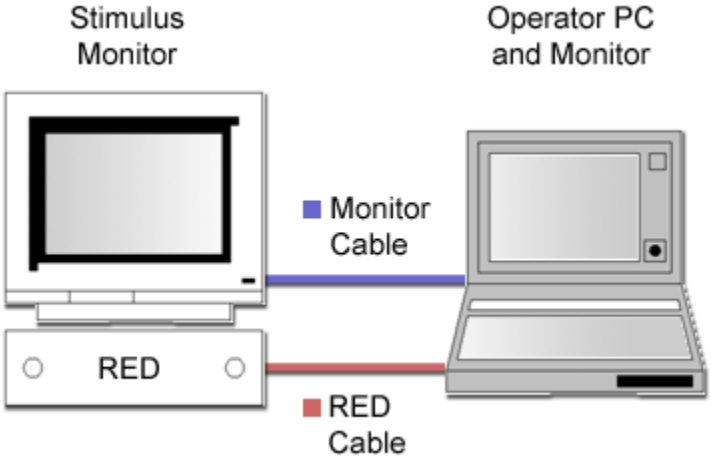
- During experiment design time, you start the Experiment Center 2.3 software and create the ”storyboard” for the visual stimuli to present. You have to lock the experiment to prevent changes during experiment execution. For test purposes you can check the stimuli combination with the dry run function until it is sufficient for your needs. You then save the results to an experiment.
- The necessary data storage is automatically created by Experiment Center 2.3. Therefore you simply enter an experiment name. With this experiment name a subdirectory will be created which contains similar named experiment files.
- During experiment execution time, you start Experiment Center 2.3 which automatically connects to the iView X eye tracker. You load the created experiment and present the prepared stimuli to your subjects one by one. Experiment Center 2.3 now records the subject's eye movements while he or she is viewing at or interacting with the presented stimuli. While recording, Experiment Center 2.3 automatically stores the eye and gaze tracking data and the corresponding stimuli files to an experiment results directory for later analysis.

A typical gaze tracking experiment involves persons with two different roles: an operator who controls the experiment and a subject whose gaze position and actions are monitored. The operator starts the experiment, enters information for each subject (e.g. the subjects name), and verifies the calibration necessary to adapt the iView X eye tracking software to the subject's eye characteristics.

4.4 System Setup

For eye and gaze tracking experiments with Experiment Center 2.3, two different system setups are possible:

- With a single PC setup, one iView X system runs the iView X gaze tracking system as well as Experiment Center 2.3. Both components are interconnected using a PC-internal socket connection. This is the recommended standard configuration depicted below.



- With a double PC setup, the iView X gaze tracking system is executed on one PC. This PC is connected to the gaze tracking device which is for example an RED4 interface mounted underneath the visual stimulus monitor. Experiment Center 2.3 is executed on a second PC. Both components are interconnected using a UDP/IP socket connection (see Global Settings 17). This setup can be used for example if dedicated performance requirements exist and the CPU usage of the iView X system disturbs the visual presentation or subject interaction.

While it is possible to execute experiments using a single monitor, the standard experiment setup includes a double monitor setup: one monitor for the operator and a second monitor to present the visual stimuli to the subject (see Double Monitor Settings 23).

Please read also the chapter Limitations / Setup recommendations 86

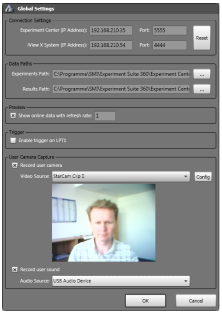
Configuration

Chapter

5 Configuration

5.1 Global Settings

The **Global Settings** dialog allows you to change the Experiment Center 2.3 configuration. If you simply want to reconnect Experiment Center 2.3 to the iView X system, confirm the current settings with **OK**.



To change the Experiment Center 2.3 default configuration depicted above proceed as follows:

1. In the Application Window 66, click  . Alternatively, select the **Extras**: **Global Settings** menu command.

   The **Global Settings** dialog opens.

2. In the **Connections Settings** section, configure the network connection which is used to control and query the iView X system (see Network Settings 19). Click the **Reset** button to revert to the program defaults (localhost IP and port settings)

3. In the **Data Paths** section, configure the location where experiment related files are saved (see Directory Structure 78).

   The **Experiment Path** setting determines the storage location for experiment and stimulus data. For optimal results, the **Experiment Path** setting shall point to a local hard disk drive.

The **Results Path** setting determines the storage location for of experiment results created while running an experiment. For optimal results it is strongly recommended that the **Results Path** setting shall point to a local hard disk drive.

Activate the **Show online data** option to view the subject's gaze position, visible as small yellow circle in the preview area displayed in the upper right of the Application Window 66. The **Frame rate** setting determines the update frequency for the preview thumbnail of the stimulus monitor and the gaze position cursor. The default update rate is "1" which configures one update per second. For performance reasons it is not recommended to use higher values.

Activate **Enable trigger on LPT1** to create a trigger each time a stimuli has changed. The start value is zero when an experiment starts and is increased every time a stimuli change happens.

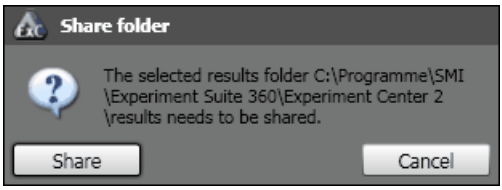
Activate **Record user camera** and select the connected webcam device from the **Video Source** selection. A preview windows is showing the video of the currently selected webcam. The **config** button is opening the webcam specific settings dialog (please refer to user manual of the selected webcam).

Activate **Record user sound** and select an audio input device from the **Audio Source** selection in order to add audio recording to the webcam video. Audio recoding without video is not possible.

User camera and user audio recording requires the observation package license

4. Activate Enable trigger
5. Confirm your settings with **OK**.

When you've entered a foreign IP address of a remote iView X PC to configure a two-PC-setup you need to confirm that the result path is shared in the network. This is necessary in order to allow iView X to write the eye tracking data remotely into the result directory.



The changed settings are applied. If they do not exist, Experiment Center 2.3 now creates the configured directories and also establishes the connection to the iView X system using the configured network settings.

It is not possible to change the directories while an experiment is open.

5.2 Network Settings

Experiment Center 2.3 needs to connect the iView X system in order to control the gaze tracker and to acquire gaze tracking data.

With a single PC setup, the iView X software is running on the same system. To establish a connection to the same host, the following default settings are used in Experiment Center 2.3:

- **Experiment Center Listening Port**: ”5555”
- **iView X System (IP address)**: ”localhost” or ”127.0.0.1”
- **Port**: ”4444”

For the iView X software, complementary settings are required. This means, that

- the listen port in iView X is the sending port of Experiment Center 2.3 and
- the sending port in iView X is the listening port of Experiment Center 2.3.

The Global Settings 17 dialog displays the IP address assigned to the PC running Experiment Center 2.3 next to **Experiment Center (IP Address)**. While you can configure this IP address in iView X, it is recommended to use "127.0.0.1" or "localhost" if iView X is running on the same PC.

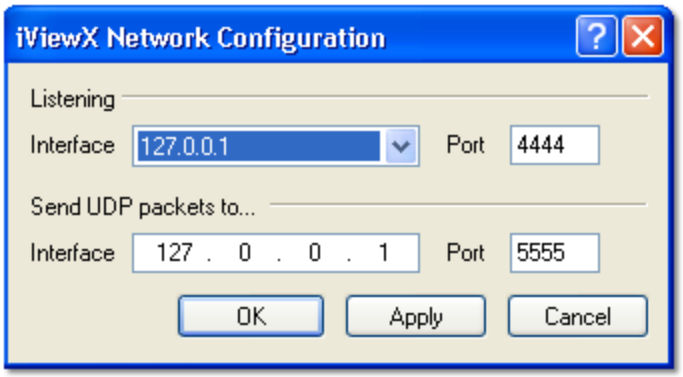
Double PC Setup

It is possible to run Experiment Center 2.3 and iView X on different PCs. In this configuration, the second PC, which runs iView X, must be able to write the eye tracking *.idf file to a network share which is located on the PC running Experiment Center 2.3.

The result path is automatically shared on the stimulus PC which need to be confirmed when you press the **OK** button in the Global Settings Dialog.

Change Network Configuration

In the iView X **Hardware** dialog, select ”Ethernet” in one of the **Remote Interface** drop-down lists. Click the corresponding **Configure** button and copy the configuration depicted below.



With a double PC setup, the iView X software and Experiment Center 2.3 run on different PCs. To establish a connection, change the IP address in both configuration dialogs:

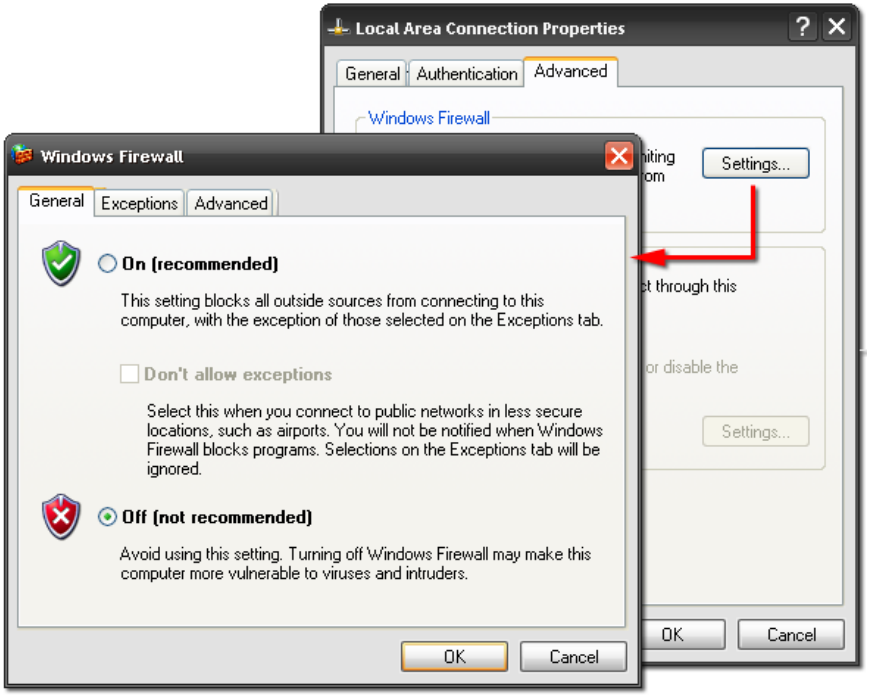
- In the Experiment Center 2.3’s **Global Settings** dialog, enter the IP or

the NetBios name of the PC running the iView X software.

- In the **iView X Network Configuration** dialog, enter the IP address of the PC running Experiment Center 2.3. You may copy the IP address displayed in the Global Settings 17 dialog next to **Experiment Center (IP Address)**.

Unblocking the Firewall

Note that installed firewall products may block the communication. For example, you need to confirm the network connection with the pre-installed Windows personal firewall.

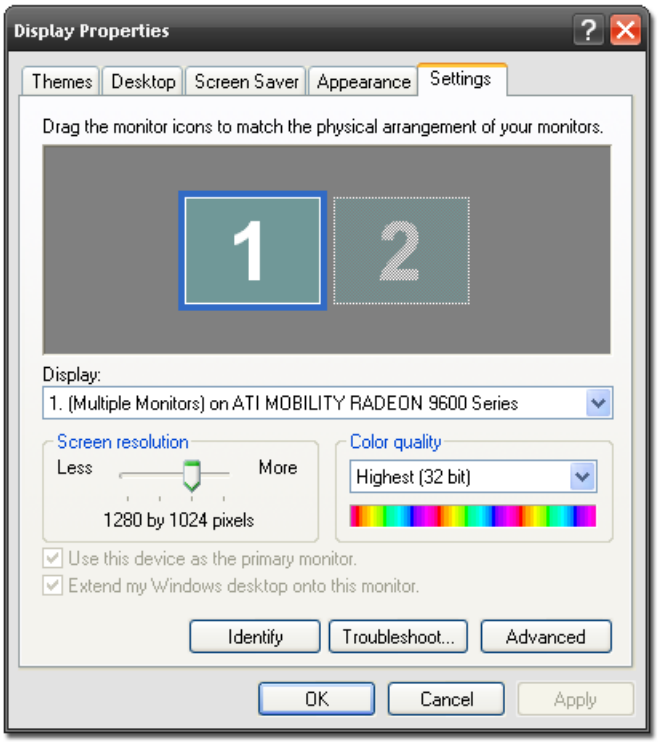


If you trust your local network environment, you can also disable the Windows personal firewall completely.

1. Right click the **Network Environment** icon located on the desktop or in the Windows **Start** menu. Select the **Properties** context menu entry.
2. In the **Network Environment** window, right click the Local Area Connection icon. Select the **Properties** context menu entry.
3. In the **Local Area Connection properties** dialog, navigate to the **Advanced** tab and click **Settings**.
4. In the **Windows Firewall** dialog, navigate to the **General** tab and select **Off**.
5. Confirm with **OK**.

5.3 Double Monitor Settings

To operate the double monitor setup, the corresponding system functions of the Windows operating system are used. Note that most note books provide an additional monitor plug for this. Otherwise you need a graphics adapter with double monitor (”dual head”) support.



The following steps activate the second monitor:

1. In the Windows **Control Panel**, select the **Appearance and Themes** category. With Windows XP, open the **Display Properties** applet and switch to the **Display Settings** tab. With Windows Vista, select the **Change display resolution** task.

2. Check whether the display driver supports a second monitor. This is the case if two screen icons (”1” and ”2”) are displayed. Check whether the second monitor is operational. This is true if the second monitor icon is not grayed out. Otherwise plug in and switch on the second monitor. You may need to re-open the **Display Properties** applet or – with some older notebooks – you may need to restart Windows.
3. Click on the second monitor icon and select the desired screen resolution. Confirm with **OK**.

In a standard setup, for example if you are the operator sitting in front of an notebook, you may use the second monitor to present the visual stimuli to your subject. To activate the second monitor as stimulus monitor:

1. Select the **\DISPLAY2** entry in the **Select Stimulus Monitor** control of Experiment Center 2.3.
2. Click the **Identify** button (

) to verify the double monitor settings. The operator screen is identified by a large **1**, while the subject should be placed in front of the monitor displaying a large **2 (Stimulus Monitor)**. The identify overlay disappears automatically after some seconds.

If you change the Windows monitor setup, you need to restart Experiment Center 2.3 to update the **Select Stimulus Monitor** control.

Step-by-step Instructions

Chapter

6 Step-by-step Instructions

6.1 Step-by-step: Overview

In Experiment Center 2.3, you process the measurement data using the following steps:

1. Prepare the experiment: You can start with a new experiment 28 or open an existing one 29 and modify it. To modify an experiment, you have to unlock it.

   Preparation also consists of calibration 35 and selection of the appropriate visual stimuli 33 (such as text or images) which fits to the research objective. As an option, you may also add custom subject properties allowing you to characterize/group individual subjects during the experiment.

2. End preparation by locking the experiment.
3. Test the experiment design with a dry run 53.
4. Run experiment: If the dry run meets your requirements, start the experiment 54. The system will perform calibration and after that present the stimuli to the subject.

   The experiment and it's results will be stored according to the defined directory structure 78.

5. Analyze the measurement data 64 using the BeGaze 2.3 analysis software.
6. For database maintenance, you may delete unnecessary experiments 32 later on.

The following topics in this help book provide step-by-step instructions to carry out these specific tasks with Experiment Center 2.3.

6.2 Starting Experiment Center

As a precondition, the iView X system needs to run in order to allow Experiment Center 2.3 to auto-connect:

1. Double click the iView X icon on the desktop.

   iView X icon

2. To start Experiment Center 2.3, use the Windows **Start**: **All Programs** : **SMI**: **Experiment Suite 360°**: **Experiment Center 2.2** menu command. Alternatively, double click the following icon on the desktop.

   Experiment Center 2.3 icon

   During startup Experiment Center 2.3 automatically tries to establish a connection to the iView X system. If that fails, Experiment Center 2.3 tries to establish a connection with the settings from the last successful session.

3. Check the status of the connection by examining the connection button:

   Indicates that the connection is established. When the mouse cursor is over the icon, information is shown about the connected eye tracking device and iView X software version

   Indicates that the connection is currently not established.

As long as no connection is established, you cannot start a recording. If this is the case, check whether iView X is running and if the connection settings are correct (see Global Settings 17).

6.3 Preparing Experiments

6.3.1 Creating a New Experiment

An experiment is a set of visual stimuli that are presented in a sequential order to the subject.

Create experiment

To create a new experiment proceed as follows:

1. Double click the  icon on the desktop.

   The Application Window 66 opens. It is already disposed to create a new experiment. The calibration element is already included in the list of stimuli.
2. Add new stimuli 33 and edit the stimuli's properties.
3. Set calibration properties 35.
4. Optional: add subject properties 51.
5. When setting is completed, click  to lock the experiment. This way settings cannot be changed accidentally.
6. Save the experiment (see Saving Experiments 30).

The currently logged in user information is added a new experiment automatically. The creating user information includes the current Windows workstation name as well as the Windows log in name. This information helps you to identify experiments, for example if you reopen experiments later on or if you analyze the experiment using BeGaze 2.3.

Execute experiment

Start the experiment (see Running an Experiment 54) or test the settings with a dry run 53.

6.3.2 Loading and Changing an Experiment

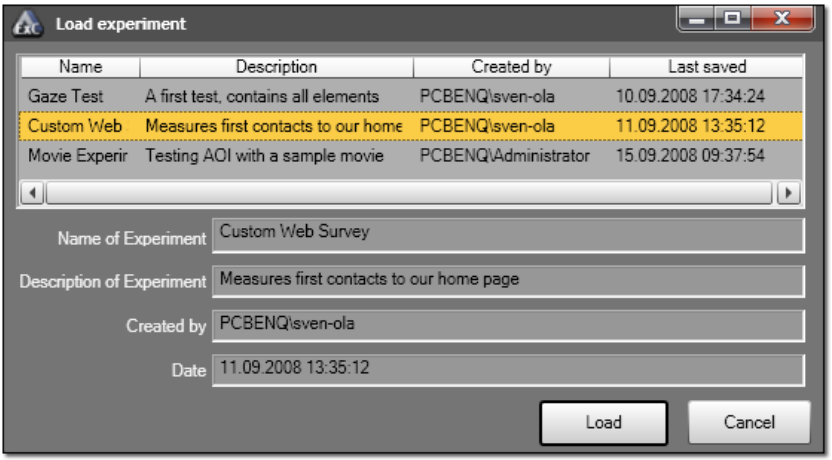
In a typical gaze tracking experiment the stimulus presentation may be adapted to a modified research objective. You can create a new experiment for this, but it is also possible to modify an existing one.

Load and change experiment

To modify an existing experiment proceed as follows:

1. Click  in the top toolbar.

   The **Load experiment** dialog opens, presenting a list of existing experiments.



2. Select the desired experiment.
3. Click **Load**.

   The experiment is loaded into the Application Window 66.

4. Ensure that the experiment is unlocked (). If it is locked, click

 to unlock.

5. Edit or modify experiment settings:

   Add new stimuli or change the stimuli settings. The order of stimuli can be changed as well (for more information see the help topic entitled Setting Stimuli 33).

   Change calibration properties 35.

6. Click  to lock the experiment. This way settings can not be changed accidentally.
7. Save the experiment (see Saving Experiments 30).

Execute experiment

Start the experiment (see Running an Experiment 54) or test the changed settings with a dry run 53.

6.3.3 Saving Experiments

To save an experiment proceed as follows. Note that you do not simply save an experiment file. Instead, Experiment Center 2.3 uses the experiment name to create a subdirectory in the **experiments** directory which contains all used stimulus files and the experiment file (see Data Storage Structure 78).

1. Click  in the top toolbar. Alternatively, select the **File**: **Save** menu command or press the `[CTRL] + [S]` key combination.

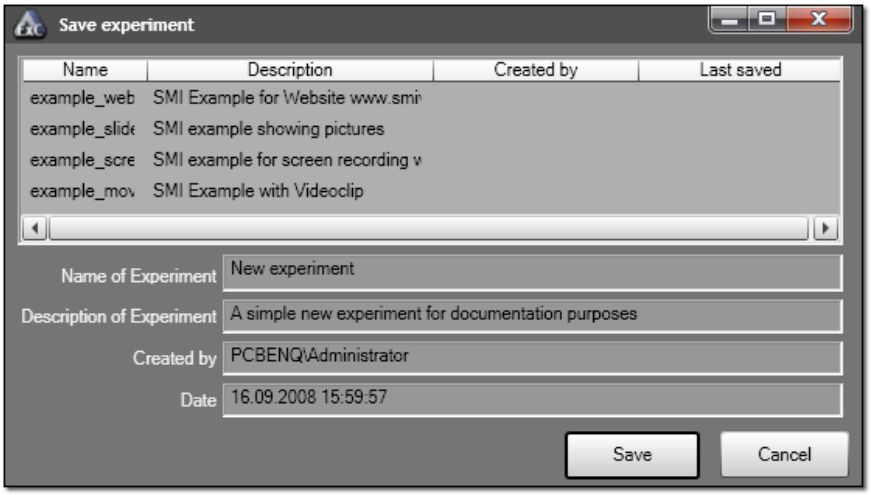
   The **Save experiment** dialog opens presenting a list of existing experiments.

2. Enter a relevant experiment name and add a short experiment description in the input fields of this dialog. Do not use characters not valid for file names, such as “/”, “\”, “:”, “|”, or “<”. Use letters A-Z, digits

0-9, or the space character instead.

3. Click **Save**.

Overwriting an existing experiment might invalidate already acquired eye tracking data.



Save experiment to a new name

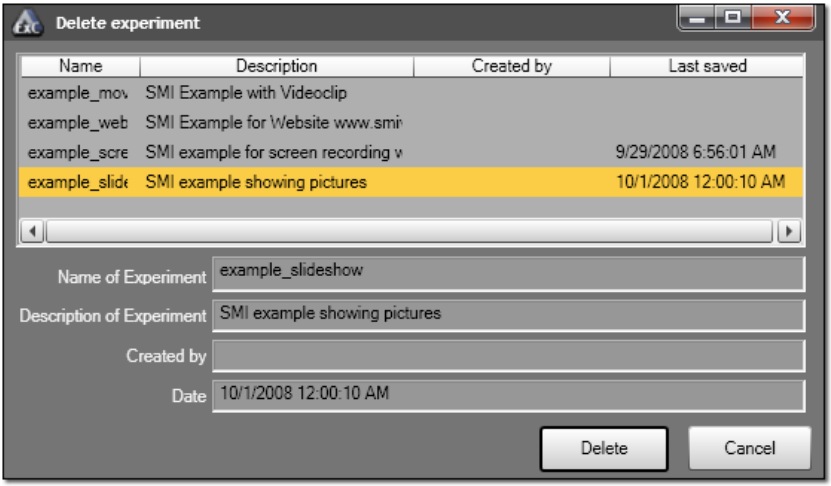
1. Select **Save as…** from the **File** menu to save the experiment with a new name.
2. In the **Save experiment** dialog, enter the new name in the **Name of Experiment** field.
3. Add a short experiment description in the **Description of Experiment** input field.
4. Change the **Created by** information if desired. This information is inserted automatically when creating a new experiment.
5. Click **Save**.

6.3.4 Delete Experiments

Over time, the Experiment Center 2.3 data base may include superfluous experiments. You can remove experiments with the following steps. Note, that the corresponding sub-directory is removed from the **Experiments** folder (see Data Storage Structure 78).

1. From the **File** menu, select the **Delete Experiments...** command.

   The **Delete Experiment** dialog opens.



2. Select and experiment from the list. You can select multiple experiments also. Press the [CTRL] key and select additional entries concurrently.

3. Click **Delete**.

   A query dialog opens, asking for confirmation. Click on **Cancel** to stop now. Click on **Delete** to confirm.

4. After the first confirmation, a second query dialog opens asking you if you also want to remove previous recorded results from the hard disk.

   Click **Delete** to remove the results. Click **Keep Results** if you do not want the results to be removed.

You cannot revert the deletion of data after confirming one of the security queries. For this reason, you should make backups of your user data frequently.

6.3.5 Stimuli Settings

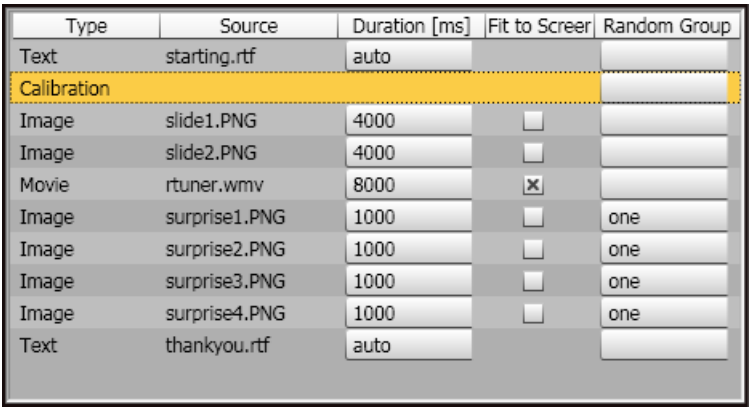
A stimulus is something that is presented on a monitor to the subject in front of the monitor. Experiment Center 2.3 supports a broad range of stimuli types and allows combining them in one experiment. Each stimulus is represented as an element in the Application Window 66. While preparing the experiment, the operator can set the properties of each stimulus individually according to the experiment objective. The presentation can contain text 37, an image 41, a movie 43, a web site 44 or an interactive screen recording 47.

Add stimulus

To add stimuli to be used in your experiment proceed as follows:

1. Click the desired button in the top toolbar 68. Alternatively, you can choose the respective entry from the Insert 71 menu.

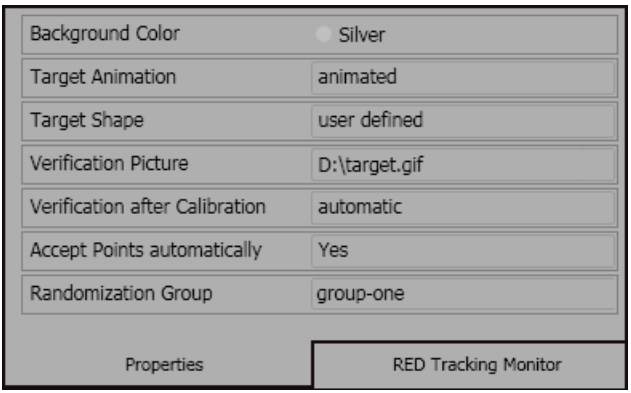
   The stimulus is added to the list of stimuli as a new element.



2. Select one or more stimuli elements to set their properties.

   The stimulus will be displayed in the preview window. The stimulus properties will be displayed in the properties window. Depending on the stimulus type, different properties are available.

3. Enter the desired values in the properties pane.



Delete stimulus

To remove stimuli not to be used in your experiment proceed as follows:

1. Select one or more stimuli in the list.
2. Press [DEL]. Alternatively, right click the desired stimulus entry and select the **Delete Object** command from the context menu.

Change order of stimuli

While you are designing an experiment, you may want to change the order of stimuli. To do so, proceed as follows:

1. If the experiment is locked, click  to unlock.
2. Select an element with the mouse and drag it to the desired position in the list. While moving the mouse cursor, the currently focused list item is marked with a blue border.

If you move the mouse cursor up, the stimulus element will be placed previous to the blue marked list item.

If you move the mouse cursor down, the stimulus element will be placed after the blue marked list item.

3. To test the changed sequence, navigate through the list of stimuli using the cursor [UP] / [DOWN] keys or navigate through the list using the arrow buttons below the preview pane:

Selects the previous stimulus

Selects the next stimulus

6.3.5.1 Calibration

Calibration is the adaptation to the current subject's eye characteristics. During calibration, a number of targets in known screen locations are presented to the subject. The subject needs to fixate the presented targets while the position of the subject's gaze is registered by the iView X system.

To get correct measurement results, it is vital to execute calibration before presenting your stimuli. Gaze tracking data acquired before calibration is completed successfully may be incorrect.

If you create a new experiment, the calibration is included as the first element in the list of stimuli by default. It is possible to move the calibration element to another position, for example to prepend a text message as subject information on the display.

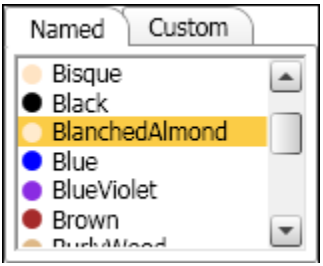
Edit calibration settings

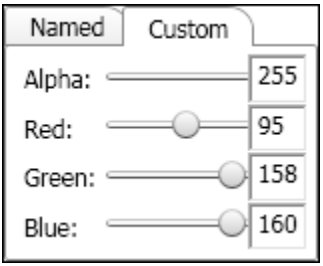
To edit the calibration settings proceed as follows:

1. Select the calibration element in the list of stimuli.

   The properties pane shows the current calibration settings. The preview pane displays the used target symbol.

2. **Background Color** field: Click on to open the color selection dialog, offering separate color tabs. Select the desired background color.





The selected color will also be used as frame color for all stimuli if they do not fit to the full screen.

3. **Calibration method** field: The number of calibration points being used for the calibration can either be taken as a default directly as defined in iView X or can be directly selected (2/5/ 8/9/13 points). If the connected eye tracking device doesn't support the selected calibration method then the best device specific default settings is being used instead.

4. **Target Animation** field: This field determines, if the calibration target is animated. To change the animation mode, click . Select **none** for the default static target. Select **blink** for a target which is blinking twice. Select **animated** for a target which moves as an animation from point to point.

5. **Target Shape**

   a) **Target Shape** field: This field indicates the currently used target.

   To change the target, click and select one of the following list entries from the drop-down list: “black circle”, “white circle”, “black cross”, “white cross”. Select "user defined" to open the **Select a file** dialog. Navigate to the Experiment Center 2.3 program directory and select the desired bitmap graphics file (BMP, JPG, PNG, ICO or animated GIF) to be used as calibration target. Click **Open**.

b) **Target Shape** direct button in the preview window. Click on that button and select one of the four predefined targets or select a user defined target.

The maximum size for user defined target shapes is 128x128 pixel.

6. **Quality check** field: Click to open a drop-down list:

– Select **Calibration** if the calibration quality shall be shown in a dialog box after the calibration. The calibration quality is presented visually and the average deviation of the users gaze during calibration in comparison to all calibration points is shown. The operator can decide to continue or repeat the calibration if desired.

– Select **Validation** if a validation shall be executed at the end of the calibration routine, by showing four additional points to the subject. The validation quality is then presented visually and the average deviation of the subjects gaze to the validation points is shown. The operator can decide to continue or repeat the calibration if desired.

– Select **None** setting, to continue with the next stimulus unconditionally.

After you have set the calibration continue with selecting and setting up the stimuli 33.

6.3.5.2 Text Stimulus Element

A text stimulus is entered in a special editor window provided by Experiment Center 2.3 (see Text Editor Window 75). The text editor allows you to edit the text content while displaying nearly the end result visible later during the experiment (”WYSIWYG”).

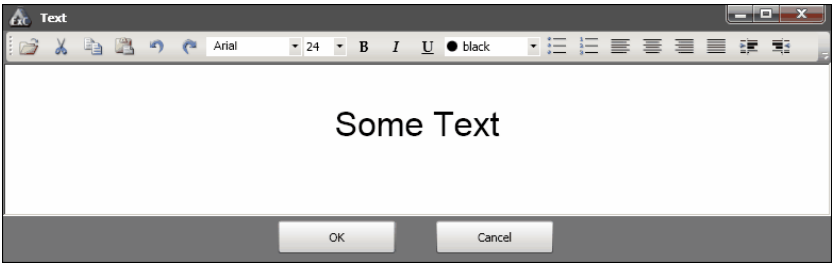
This is especially true if you press [F12] to toggle between full screen mode and normal mode.

Insert stimulus element

To insert a text stimulus element proceed as follows:

1. Click  in the top toolbar.

   The text editor window opens.



2. Enter new text or paste them from the clipboard. Alternatively, click  to open an existing RTF text file. Use the toolbar buttons to format 75 the text.

   Note: An imported RTF text may carry objects (e.g. images, spreadsheets) which cannot be displayed as text.

3. To close the text editor, click it's **OK** button.

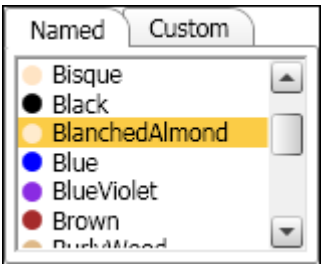
   In the Application Window, a new text stimulus element is added to the list of stimuli.

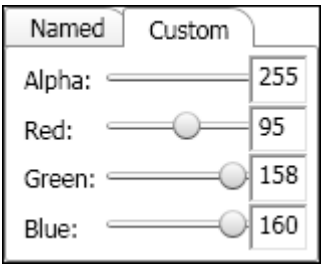
Edit stimulus element

To edit the properties of the text stimulus element proceed as follows:

1. Select the element. You can check it's design in the preview pane on the right.

2. **Background Color** field: Click on to open the color selection dialog, offering separate color tabs. Select the desired background color.





3. In the properties pane, enter the transition time in the **Duration** field (min. 500 milliseconds). The duration time can either be a fixed value in ms or a time range larger than 500ms, e.g. 500-4000. In case of a time range, the duration time is randomized within the range. After this duration has elapsed, the next stimulus element will be presented. Enter the ”auto” keyword if you want to proceed manually using the `[SPACE]` key, the `[>]` key, or `[F11]`.
4. In the **Record User Events** field, click to open a drop-down list. Select **Yes** if user events such as key presses (except function keys) and mouse clicks should be recorded in the resulting IDF file. You can evaluate recorded user events in BeGaze 2.3 later on. Otherwise select **No** (default).
5. In the **Presentation Width [Pixel]** field, the presentation (rendering) of the text on the stimulus display can be limited to a smaller area than the screen width. If a value smaller than the current screen width resolution is entered, the text area is centered on the screen with left and right borders.The default value is "screen width", which means that the text is automatically rendered to the full screen resolution.

Change text of a text stimulus element

If necessary, you can edit the text in two ways, e.g. to change it’s font size or alignment.

Direct Button "Edit"

1. Press the **Edit** button on top of the preview pane
2. Edit the test and/or change it’s properties.
3. Click **OK** to close the text editor window.

Property window

4. Select the appropriate text stimulus in the list of stimuli.
5. In the **Properties** pane, click the  button in the **Content** field.

   The text editor window opens displaying the text stimulus.
6. Edit the test and/or change it's properties.
7. Click **OK** to close the text editor window.

Direct Button "Trigger AOI"

1. Use the direct button **Add Trigger AOI** in the preview pane to add an AOI on the text. During execution this area is not visible and triggers the presentation of the next stimuli when the respondent looked more than "Dwell time" milliseconds into that area. The AOI can be moved and changed in size within the text area.
2. Edit the **Dwell time** in ms which should be used dwell time to trigger the next stimuli. The default dwell time is 1000ms.

If the reading package is licensed, AOIs on text elements for further analysis in BeGaze 2.3 are automatic generated during experiment execution.

6.3.5.3 Image Stimulus Element

You can use a single image in your experiment as well as a series of images to perform a slideshow.

Insert stimulus element

To insert an image stimulus element proceed as follows:

1. Click  in the top toolbar.

   The **Select Image** dialog opens.

2. Select the desired image from the directory list (*.bmp, *.jpg, *.png, *.wmf, or *.tif files). You can also select multiple images from the

directory.

3. Click **Open**.

   In the Application Window, a new image stimulus element is added to the list of stimuli. If you have selected multiple images, each image is added as a separate stimulus element.

Edit stimulus element

Direct Button

1. Use the direct button **Add Trigger AOI** in the preview pane to add an AOI on the picture. During execution this area is not visible and triggers the presentation of the next stimuli when the respondent looked more than "Dwell time" milliseconds into that area. The AOI can be moved and changed in size within the picture.

2. Edit the **Dwell time** in ms which should be used dwell time to trigger the next stimuli. The default dwell time is 1000ms.

Property Window

To edit the properties of an image stimulus element proceed as follows:

1. Select the element. You can check it in the preview pane on the right.
2. In the properties pane, enter the transition time in the **Duration** field (min. 500 milliseconds). The duration time can either be a fixed value in ms or a time range larger than 500ms, e.g. 500-4000. In case of a time range, the duration time is randomized within the range. After this duration has elapsed, the next stimulus element will be presented. Enter the ”auto” keyword if you want to proceed manually using the `[SPACE]` key, the `[>]` key, or `[F11]`.
3. In the **Fit Image to Screen** field, click to open a drop-down list. Select **Yes** to display the image in full screen mode. Note that the scaling preserves the aspect ratio of the image. Select **No** if you want to keep the image's original size. The display area not covered by the

stimulus is filled with the calibration background color.

4. In the **Record User Events** field, click to open a drop-down list. Select **Yes** if user events such as key presses (except function keys) and mouse clicks should be recorded in the resulting IDF file. You can evaluate recorded user events in BeGaze 2.3 later on. Otherwise select **No** (default).

6.3.5.4 Movie Stimulus Element

You can use a movie file in your experiment. The movie file needs to be playable with the installed Microsoft Media Player (see Supported File Formats 82).

Insert stimulus element

To insert a movie/video stimulus element proceed as follows:

1. Click  in the top toolbar.

   The **Select Movie** dialog opens.

2. Select the desired movie from the directory list. You can also select multiple movies from the directory.

3. Click **Open**.

   In the Application Window, a new movie stimulus element is added to the list of stimuli. If you have selected multiple movies, each movie is added as a separate stimulus element.

Movies are automatically re-encoded during import if they are not stored in an optimized format. Optimized format means that the videos can be analyzed at its best performance afterwards in BeGaze. Therefore the videos are re-encoded using the XMP4 codec with settings that allows best seek performance. It might be possible that the video quality is slightly effected after re-encoding.

Supported file formats (before optimization) are avi, wmv, asf, mpg, mpeg, mpe, vob, mp4, m4v, mkv. It must be ensured from the creator of the experiment that the video codec which is necessary to play back the original video is installed on the Experiment Center PC.

Edit stimulus element

To edit the properties of a movie stimulus element proceed as follows:

1. Select the element. You can check it in the preview pane on the right.
2. In the properties pane, enter the transition time in the **Duration** field (min. 500 milliseconds). The duration time can either be a fixed value in ms or a time range larger than 500ms, e.g. 500-4000. In case of a time range, the duration time is randomized within the range. After this duration has elapsed, the movie stops and the next stimulus element will be presented. Enter the ”auto” keyword if you want to play the movie until it’s end or proceed manually using the `[SPACE]` key, the `[>]` key, or `[F11]`.
3. In the **Fit Movie to Screen** field, click to open a drop-down list. Select **Yes** to display the move in full screen mode. Note that the scaling preserves the aspect ratio of the movie. Select **No** if you want to keep the movie's original size. The display area not covered by the stimulus is filled with the calibration background color.
4. In the **Record User Events** field, click to open a drop-down list. Select **Yes** if user events such as key presses (except function keys) and mouse clicks should be recorded in the resulting IDF file. You can evaluate recorded user events in BeGaze 2.3 later on. Otherwise select **No** (default).

6.3.5.5 Web Stimulus Element

You can use a web site in your experiment. The web site needs to be viewable with the installed Microsoft Internet Explorer.

Insert stimulus element

To insert a web stimulus element proceed as follows:

1. Click  in the top toolbar.

   In the Application Window, a new web stimulus element is added to the list of stimuli.

2. In the **Web address (URL)** field of the properties pane, enter the desired URL. The web stimulus browser displayed during the experiment will start with this URL later on. The **Home** button of the browser navigates to this URL also.

3. In the **Navigationbar** field, click to open a drop-down list. Select **visible** if the navigation bar should be visible for the subject during the experiment run. Otherwise select **invisible**.

4. In the **Background Screenrecording** field, click to open a drop-down list. Select **Yes** if a screen recording video with a fixed rate of 10fps should be recorded in parallel, while the subject is operating the web stimulus browser. Please always have in mind that screen recording is taking a lot of processor performance. Otherwise select **No** (default).

5. In the **Presentation Width [Pixel]** field, the presentation (rendering) of the text on the stimulus display can be limited to a smaller area than the screen width. If a value smaller than the current screen width resolution is entered, the text area is centered on the screen with left and right borders.The default value is "screen width", which means that the text is automatically rendered to the full screen resolution.

6. In the **Record User Events** field, click to open a drop-down list. Select **Yes** if user events such as key presses (except function keys) and mouse clicks should be recorded in the resulting IDF file. You can evaluate recorded user events in BeGaze 2.3 later on. Otherwise select **No** (default).

7. In the **Analysing Mode** field, click to open a drop-down list.

- Select **Full Website** to record a single large image for a web page the subject visits. Each image represents the complete web site and includes content displayed "below the screen". Again, special care should be taken, if the navigation bar is visible for the subject, because the navigation bar is always visible to the subject while she/ he is scrolling down a large web page. During experiment analysis in BeGaze 2.3, you may need to filter out those gaze positions which refer to the navigation bar. This mode is especially helpful, if you are interested which objects on a web page attract the subjects gaze.

- Select **Landing Page** to record a series of still images with the screen resolution of the stimulus monitor. These images are screen shots recorded while the subject is navigating the web stimulus browser. Special care should be taken, if the navigation bar is visible for the subject and the web site to navigate needs scrolling. All recorded images in **Landing Page** mode will include the navigation bar. This mode is especially helpful, if you are interested in the site navigation decisions.

8. Confirm with the `[Enter]` key.

   The web stimulus element has not further properties.

The subject uses the web browser during the experiment similar to a standard web browser. All interactions to the web page like entering text, clicking on links, etc. are allowed. The user cannot change the address field of the browser.

The web browser offers the following control buttons:


Navigates to the previous history entry


Reloads the current web page


Navigates to the next history entry


Stops loading the current web page

Stops web browsing and presents next stimulus


Navigates to the home URL

`[F11]` key: stops the web browsing stimulus and proceeds with the next stimulus

The web stimulus element is mainly designed to analyze visual attention for multiple users and user groups. To achieve the best possible comparison between different users, there are some limitations regarding active web content. Note that the navigation from web page to web page is also recorded in the Subject Protocol 62.

Recording of gaze data starts when the web site starts to load. In addition, a user message “URL completely loaded” is generated and stored in the *.idf file when the web site is completely loaded which can be analyzed together with the gaze data in BeGaze 2.3.

The interaction between web browser developers and web page designers comprises the continued technical evolution of web content. For this reason, web pages exist which cannot be used for gaze tracking experiments. This especially includes active content such as movie sites, online games, various Web 2.0 content, incompatible HTML, or failing script code.

6.3.5.6 Screen Recording Stimulus Element

You can include a screen recording in your experiment. A screen recording is an arbitrary application that the subject can use at will. Experiment Center 2.3 concurrently records a screen capture video of all actions the subject performs when operating the application.

Insert stimulus element

To insert a screen recording stimulus element proceed as follows:

1. Click  in the top toolbar.

   In the Application Window, a new screen recording stimulus element is added to the list of stimuli.

The subject uses the application during the experiment. All interactions to the application like entering text, clicking on buttons, etc. are captured from the screen and saved to a video file while concurrently monitoring the gaze position. The operator or the subject ends the application using

the [F11] key.

Note that the screen recording does not end if the subject exits the application. Using this feature, it is possible monitor further screen interaction of the subject, such as restarting an application or a working with several applications started successively.

Edit stimulus element

To edit the properties of a screen recording stimulus element proceed as follows:

1. Select the element.
2. **Application to start** field: Click the ... button if you want to select another application.
3. **Arguments** field: Enter arbitrary arguments added to the application's command line. Most applications will accept arguments, such as one or more file names to be opened or a web URL to be loaded.
4. **Frames per second** field: This number determines how many frames per second are captured and encoded into the resulting capture video. Possible values range from 1 to 25 frames per second. The default of 10 frames per second is recommended for optimal results. It is not recommended to use higher values than 10 in One-PC-configurations. Note that entering a high value can result in a very high system load which in turn may influence the application's function and/or the iView X gaze tracking. How many frames are sensible for your purposes also depends on your CPU and screen driver resources. For example, capturing 25 frames per second on a 1280x1024x32 display requires to capture and encode 117 Megabyte/second.
5. In the **Smooth Eye Movement** field, click to open a drop-down list. Select **Yes** to enable an additional gaze cursor filter. Otherwise select **No**.
6. In the **Record User Events** field, click to open a drop-down list. Select **Yes** if user events such as key presses (except function keys) and mouse clicks should be recorded in the resulting IDF file. You can evaluate recorded user events in BeGaze 2.3 later on. Otherwise

select **No** (default).

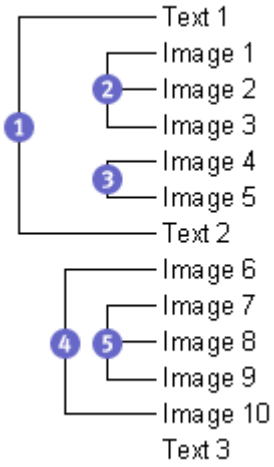
6.3.6 Randomization - Groups and Duration

Randomization Groups

You can combine multiple stimuli in a so-called randomization group. These stimuli are presented in a random order in an experiment run whereas the order changes for each experiment trial.

Randomization groups can be mixed up within the stimuli arrangement. While stimuli which are combined in a group are presented in a random order, the group position itself in the overall sequence of stimuli is absolute. It is possible to use one or more randomization groups in an experiment and also to cascade them.

Example:



The illustration shows the stimuli order of an experiment with five

randomization groups. The order of stimuli presentation may be:

First trial	Second trial
Text 1 (group 1)	Text 2 (group 1)
Image 2, 3, 1 (group 2)	Image 1, 3, 2 (group 2)
Image 4, 5 (group 3)	Image 5, 4 (group 3)
Text 2 (group 1)	Text 1 (group 1)
Image 10, 6 (group 4)	Image 6, 10 (group 4)
Image 9, 7, 8 (group 5)	Image 8, 7, 9 (group 5)
Text 3 (no group)	Text 3 (no group)

A stimulus which is not allocated to a randomization group will be presented at that position where it is placed in the stimuli sequence. In the example above, this is the case for the “Text 3” element.

Combine stimuli in a randomization group

To add a stimulus to a randomization group proceed as follows:

1. If the experiment is locked, click  to unlock.
2. Select the appropriate stimulus element in the list of stimuli.
3. Enter a group name (a number or a text) in the **Random Group** column. If you have already assigned group names within the experiment, you can alternatively click the  button and select the desired group from the drop-down list.

The Subject Protocol 62 contains the sequence and time stamps of the randomized stimuli for each trial.

Randomization of Duration

The duration time of stimuli (where applicable) can either be a fixed value in ms or a time range larger than 500ms, e.g. 500-4000. In case of a time range, the duration time is randomized within the given limits.

6.3.7 Subject Properties

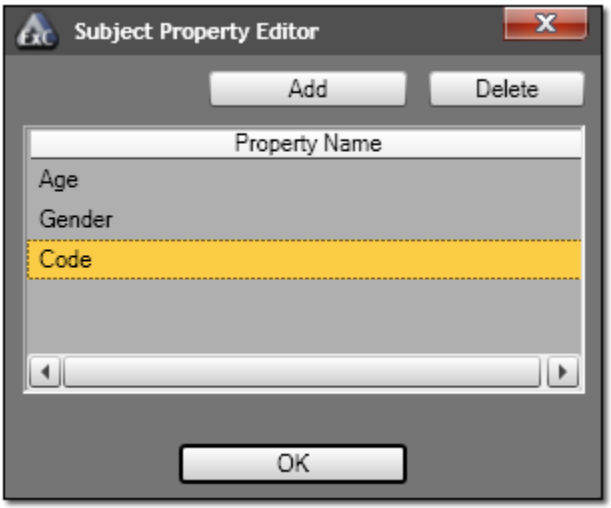
For use in the BeGaze 2.3 application, you can define individual subject “group” parameters for the experiment. These parameters are entered as subject properties and serve as additional information to your experiment. Useful properties may be “Age” and “Gender”. The subject properties are stored as meta information in a separate file written to the experiment's results directory.

Add subject property

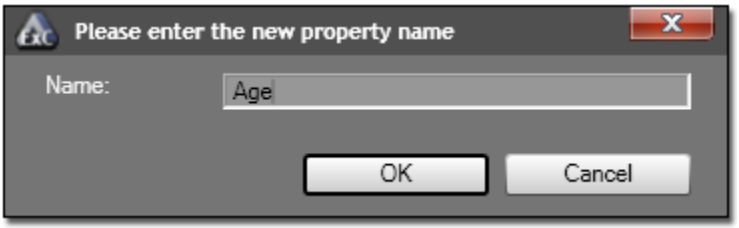
To add new subject properties proceed as follows:

1. In the **Extras** menu, select the **Subject Property Editor** command.

   The **Subject Property Editor** dialog opens.



2. Click **Add**.
3. In the following **Please enter the property name** dialog enter the name of the new property, e.g. ”Gender”.



4. Click **OK** to confirm your entry.

When you start a new experiment, the **Please enter subject information** dialog opens where you can enter the individual subject’s data (see Starting New Subject 55).

Delete subject property

To delete subject properties proceed as follows:

1. In the **Extras** menu, select the **Subject Property Editor** command.

   The **Subject Property Editor** dialog opens. The **Property Name** list displays the already defined properties.
2. Select the property you want to delete.
3. Click **Delete**.

6.4 Running Experiments

6.4.1 Dry Running an Experiment

The dry run of an experiment allows the operator to check the experiment settings before it is used. The dry run is a test scenario evaluation – without calibration and recording.

Prerequisites

Before you start the dry run ensure, that

- the appropriate experiment is loaded 29,
- the stimuli properties are set properly 33,
- the experiment has been saved.

Dry run experiment

To execute the dry run proceed as follows:

1. Ensure that the experiment is locked (). If it is unlocked, click

 to lock.

2. If you want to display the visual stimulus on a second monitor, select the desired monitor in the **Select Stimulus Monitor** drop-down list (see Double Monitor Settings 23).

3. Click  in the bottom toolbar.

   The experiment dry run starts. Calibration is skipped and nothing is recorded.

4. Press `[F12]` to stop the dry run at any time.

6.4.2 Running an Experiment

Prerequisites

Before you start recording ensure, that

- the appropriate experiment is loaded (see Loading and Changing an Experiment 29),
- the calibration properties are set (see Setting Calibration 35),
- the required stimuli are included (see Setting Stimuli 33),
- the desired subject properties are defined (see Subject Properties 51),
- the subject is seated directly in front 59 of the stimulus PC monitor,
- the eye tracking system (iView X) is started and properly connected (see Global Settings 17),
- and for a double monitor setup, the desired stimulus monitor is attached and switched on (see Double Monitor Settings 23).

Main steps

If all prerequisites are met, a typical recording is executed with these

steps:

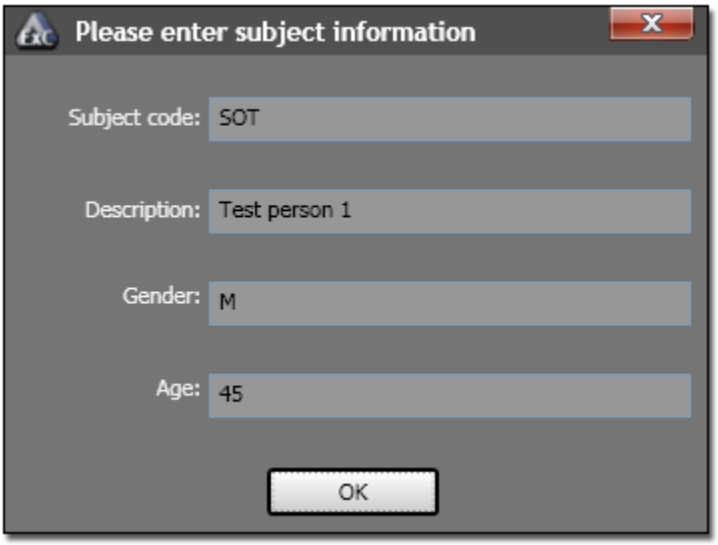
1. Start the recording for a new subject 55
2. Run the calibration 57
3. Present stimuli 60
4. End the recording 62

6.4.2.1 Starting New Subject

To start a gaze position recording for a new subject proceed as follows:

1. Ensure that the experiment is locked (). Otherwise, click  to lock.
2. Ensure that iView X is connected (). Otherwise, click  to open the Global Settings 17 dialog in order to reconnect.
3. If you want to display the visual stimulus on a second monitor, select the desired monitor in the **Select Stimulus Monitor** drop-down list or by pressing the `[F9]` key. Click the **Identify** button to verify the double monitor setup 23. The subject should be placed in front of the monitor now identified by a large **2 (Stimulus Monitor)** text display.
4. Click  or press the `[F10]` key.

   The **Please enter subject information** dialog opens.



5. Enter the mandatory **Subject code**. Note that this code is used to build the file name used to store the experiment results for the current trial. Do not use characters not valid for file names, such as "/", "\", ":", "|", or "<". Use letters A-Z, digits 0-9, or the space character instead.
6. You may enter a short description for the subject in the **Description** field. Note that it is possible to add customized input fields to the subject information dialog (see Subject Properties 51).
7. Click **OK**.

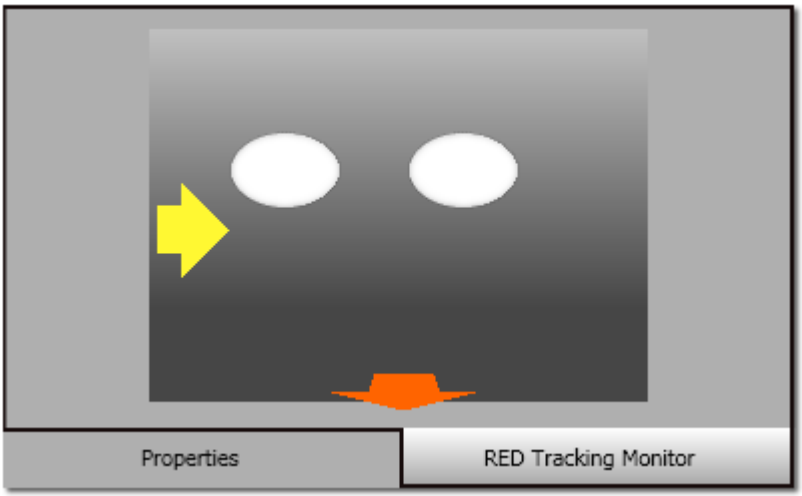
   The stimulus presentation normally starts by running the calibration.

The Windows operating system does not distinguish between upper case and lower case letters in file names. For this reason, make sure the entered subject code does not depend on used letter case.

6.4.2.2 Running Calibration

When calibration starts, a center target will appear on the stimulus monitor. If the **Show online data** option from the Global Settings 17 dialog is activated, the target as well as the subject's gaze position is visible in the preview area displayed in the upper right of the Application Window 66.

If the iView X RED (Remote Eye tracking Device) is used, the operator controls the placement of the subject using the **RED Tracking Monitor**.



To view the RED Tracking Monitor, switch to the **RED Tracking Monitor** tab which is available in the property area displayed in the lower right of the Application Window 66. Note, that the tab control is displayed only if Experiment Center 2.3 is connected to iView X (see Global Settings 17).

As a first step, the physical position of the subject is verified using the RED Tracking Monitor calibration display:

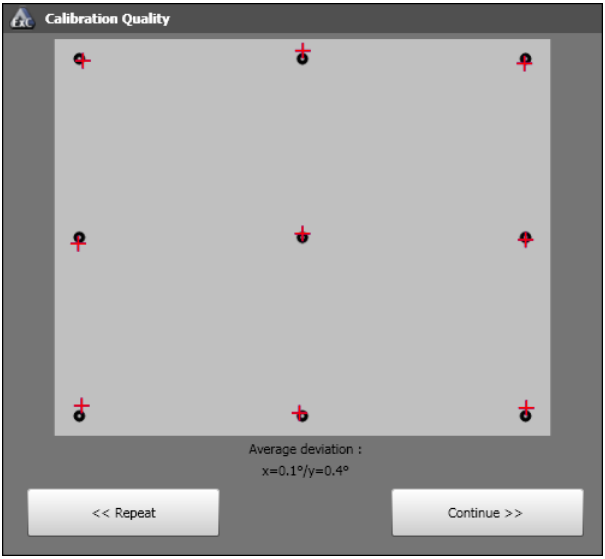
- If the eyes are tracked by the system, two white eye ellipses are visible in the scene image. If tracking is lost, the white dots disappear from the scene image.

-  If the subject sits too far away from the screen, this arrow indicates that he or she should move closer.
-  If the subjects sits too close to the screen, this arrow indicates that he or she should increase the distance to the screen.

Other arrows direct the subject to center his or her head in front of the monitor. The subject sits correctly if all arrows have vanished.

When the **Quality check** setting in the calibration element 35 is set to **Calibration**, the calibration quality dialog is shown after the calibration has been executed. The dialog shows the calculated gaze positions in comparison to the correlated calibration targets. The operator can verify the calibration quality and decide to continue or repeat the calibration if desired.

When **Validation** is selected, the dialog shows the four additional validation points with the average deviation of the subjects gaze to the validation points. The operator can verify the validation quality and decide to continue or repeat the calibration if desired.



Some calibration methods are showing perfect results when Quality check = Calibration is selected. In this case, it is recommended to change the Quality check to Validation.

For more information about calibration please refer the iView X Online Help.

6.4.2.2.1 Calibration Tips

To execute the calibration successfully please pay attention to the following guidelines.

- The environmental conditions should be approximately the same between calibration and experiment (esp. light level and subject posture).
- RED: Place the subject in a comfortable position in front of and centered to the stimulus monitor. The subject's chair should not have

wheels and pivots to minimize the amount of upper body movements made by the subject. A correct distance of the subject to eye tracking device shall be between 60 and 80 cm.

- Advise the subject to minimize his/her head movements. The subject should look at the target while keeping his/her head still as much as possible.
- You should pay attention to the overall screen stimulus brightness and luminosity. If you present very different stimuli in sequence, the subject's pupil will adapt to the light emitted by the screen. For this reason, the same background color should be used throughout all presented stimuli.

6.4.2.3 Stimuli Presentation

After a successful calibration the system processes the experiment by presenting the stimuli. The transition between stimuli can be executed automatically by the system according to the stimuli properties or manually controlled by the operator.

The following tables give an overview how to control the stimuli presentation and which keyboard shortcuts are active while presenting the respective stimulus. The **Duration** property of each stimulus determines, how the transition between stimuli is triggered.

Duration property set to “auto”:

	Text	Image	Web	Movie	Screen Recording
Automatic ends if:	–	–	–	End of movie	–
Next stimulus is presented by:	[F11] or [SPACE] or [>] key	[F11] or [SPACE] or [>] key	[F11] or  button	[F11] or [SPACE] or [>] key	[F11]
Previous stimulus is presented by:	[<] key	[<] key	–	[<] key	–

Duration property set to a value in milliseconds:

	Text	Image	Web	Movie	Screen Recording
Automatic ends if:	Timed end	Timed end	–	Timed end	–
Next stimulus is presented by:	[F11] or [SPACE] or [>] key	[F11] or [SPACE] or [>] key	[F11] or  button	[F11] or [SPACE] or [>] key	[F11]
Previous stimulus is presented by:	[<] key	[<] key	–	[<] key	–

The operator can stop the experiment at any time by pressing [F12] or by clicking the  button.

6.4.2.4 Ending Recording

The recording stops automatically after all stimuli have been presented to the subject. Alternatively, click the  button or press the [F12] key to stop at any time.

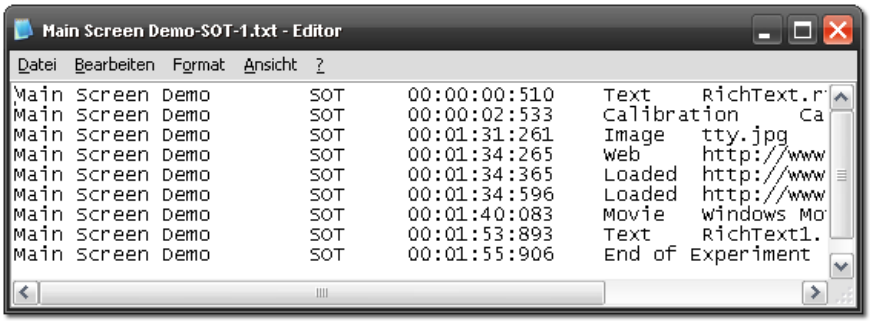
Note that all data for the actual subject are always saved into the respective *.idf file, even if you stopped the recording using the [F12] key. Also, the Subject Protocol 62 is presented at the end of the recording.

All files belonging to an experiment will be saved automatically in the experiment folder to the **\results** subdirectory. The trial separations are created automatically in the respective *.idf file.

When the experiment is finished, you can optionally start BeGaze 2.3 to analyze the experiment data.

6.4.2.5 Subject Protocol

At the end of each experiment, the subject protocol is presented in the Windows Notepad application.



The protocol for each subject is also stored as CSV compatible text file in the results folder (*.txt). Each protocol text file contains lines with the following data fields:

- the experiment's name
- the subject code entered in the subject information dialog
- the time stamp for the stimulus or event (Hour, Minute, Second, Millisecond from start of trial)
- the stimulus type such as “Text”, “ScreenRecording”, “Web”, or the event type such as “Loaded” for finishing to load a web page while running the web stimulus. Especially, the web page URL protocol may be used for web click analysis or for web landing page analysis (see Web Stimulus Element 44).
- the stimulus or event content such as file names for images, movies and text stimuli, the web page address for the web stimulus / load event, or the executable name and parameters for the screen recording stimulus.

From the presented subject protocol, you can mark and copy the data entries directly to a spread sheet application such as Microsoft Excel. Note that the data fields are separated with the tab character.

6.4.3 Analyzing Experiment Data

For analysis purposes you can view the recorded measurement data in BeGaze 2.3. The experiment's results are stored in *.idf files which are located in the **..\results** subdirectory. You can load one of these files in the BeGaze 2.3 application for visualization and further analysis.

1. Run and end the experiment (see Running an Experiment 54 and Subject Protocol 62).

2. To further analyze the experiment, click the  button in the lower right corner in order to start BeGaze 2.3 and to automatically load the current experiment data into BeGaze 2.3. If the experiment already exists in BeGaze, the exisitng experiment is been updated with the new data sets. The BeGaze button is enabled, if valid data exist and if BeGaze 2.3 is not already running.

 For more information about experiment analysis refer the BeGaze 2.3 Online Help.

User Interface

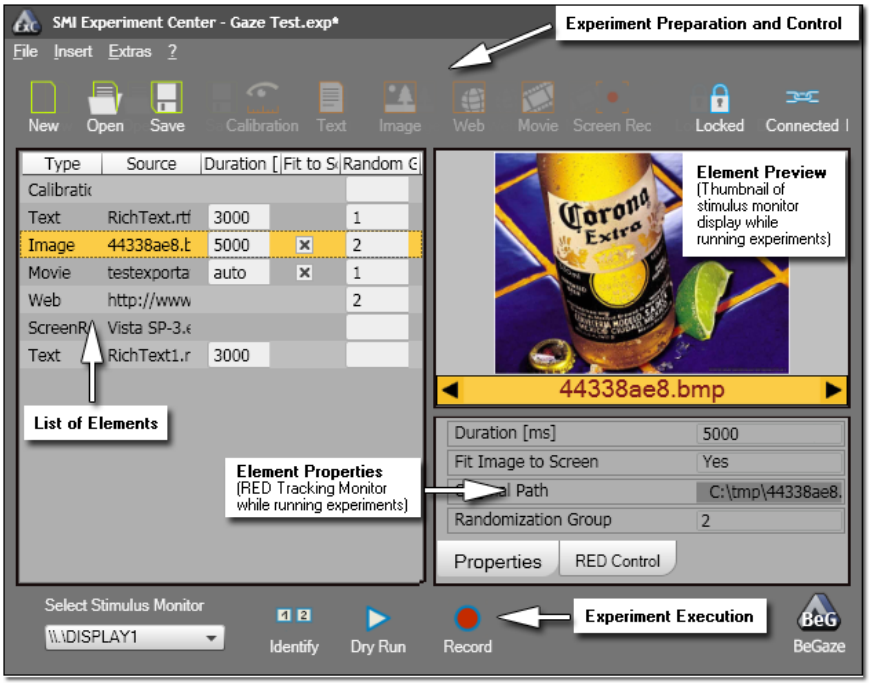
Chapter

7 User Interface

7.1 Application Window

Experiment Center 2.3 features a user-friendly intuitive interface. All steps for preparing, testing and running an experiment are executed in the Application Window. In the following you find a description of its three working areas.

- At top: Experiment preparation and control area
- In the middle: Experiment setting and preview area
- At bottom: Experiment execution area



Top: Experiment preparation and control area

This working area comprises the main menu and the top toolbar. Use the top toolbar buttons and the main menu entries to prepare your experiment and to control it. For detailed information please refer to the help topics entitled Toolbars 68 and Menu Commands 71.

The title bar indicates the program name.

Middle: Experiment setting and preview area

In this area the experiment settings are reported. On the left, the list of elements used as stimuli is presented in a single pane.

On the upper right of this area the preview pane is located. This pane shows a preview of a stimulus selected in the list of stimuli. Below the preview pane, navigation arrows allow you to display the previous (arrow left) or the next (arrow right) stimulus. While running experiments, this area also shows the current stimulus together with the subject's online gaze cursor.

On the lower right you find the properties area which shows information on a selected stimulus element. While running experiments using the RED gaze tracking device, this area can be switched to the tab showing the RED Tracking Monitor. When a User camera is selected this area can be switched to the tab showing the user camera video.

Bottom: Experiment execution area

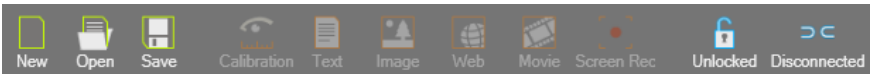
This area serves to configure and run the experiment. Use the buttons in this area to test the experiment (so-called ”dry run”) and to execute it. Moreover, you can export the experiment results to the BeGaze 2.3 program for further analysis. For detailed information please refer to the help topic entitled Toolbars 68. For information on how to run experiments please refer to the help book entitled Step-by-step Instructions 26.

Experiment Center 2.3 can be operated with separate monitors for the operator and the subject (see Double Monitor Settings 23). In this case the operator has to select and identify the appropriate monitor where the stimuli are presented to the subject. For this, the experiment execution

area contains the **Select Stimulus Monitor** drop-down list and the corresponding **Identify** command. For more information on operating modes please refer to the topic entitled Basic Operation 13.

7.2 Toolbars

Top toolbar



The toolbar is at the top of the Experiment Center 2.3 Application Window. It gives you short-cuts to important features to prepare and set up an experiment. The top toolbar consists of three units. Here is an overview of the buttons and what they are for:

Experiment storage

Button		Function
	New	Creates a new experiment
	Open	Opens an existing experiment
	Save	Saves the experiment with given name

Experiment elements selection

Button		Function
	Calibration	Adds calibration entry into the list of stimuli
	Text	Adds text stimulus element
	Image	Adds image stimulus element (*.bmp, *.jpg, *.gif, *.png, *.wmf, or *.tif file)
	Web	Adds web stimulus element (URL)
	Movie	Adds movie stimulus element (*.avi file)
	Screen Recording	Adds screen recording stimulus element

Experiment control

Button		Function
	Unlocked	Locks the experiment so that the current settings cannot be changed accidentally. The buttons of the experiment elements section are disabled.
	Locked	Unlock the experiment so that the current settings can be changed.
	Connected /	Indicates whether or not Experiment Center 2.3 is connected with iView X.
	Disconnected	Click this button to open the Global Settings 17 dialog.

Bottom toolbar

On the bottom of the Application Window, you find commands to run an experiment and export experiment data. To perform these actions, use the following buttons:

Button		Function
	Identify	Identifies the current stimulus monitor
	Dry Run	Runs experiment for test purposes (without calibration and recording)
	Record	Starts the trial to show stimuli while recording the subject's gaze position
	Stop	Stops a running trial - same as the `[F12]` function key
	BeGaze	Automatically creates or updates the experiment in BeGaze 2.3 – which is opened for analysis. This button is enabled if BeGaze 2.3 is currently not running and there are results available for the loaded experiment.

On the bottom toolbar, you also find the **Select Stimulus Monitor** drop-down list. This menu is necessary to select the monitor in dual screen mode (see Double Monitor Settings 23).

7.3 Menu Commands

The Experiment Center 2.3 software includes the following menu entries:

File menu	Function
New	Creates a new experiment ([Ctrl + N])
Open	Opens an existing experiment ([Ctrl + O])
Save	Saves the experiment with given name ([Ctrl + S])
Save as…	Saves the experiment with new name
Delete Experiments	Removes one or more experiments from the data base
Quit	Quits program ([Alt + F4])

Insert menu	Function
Calibration	Adds calibration entry into the list of stimuli ([Ctrl + C])
Text	Adds text (plain text) stimulus element ([Ctrl + T])
Image	Adds image stimulus element (e.g. *.jpg or *.bmp file) ([Ctrl + I])
Web	Adds web stimulus element (URL) ([Ctrl + W])
Movie	Adds movie stimulus element (e.g. *.avi or *.mpg file) ([Ctrl + M])

Insert menu	Function
Calibration	Adds calibration entry into the list of stimuli ([Ctrl + C])
Text	Adds text (plain text) stimulus element ([Ctrl + T])
Screen Recording	Adds screen recording stimulus element ([Ctrl + R])

Extras menu	Function
Run Calibration	Runs calibration outside of experiment
Dry Run Experiment	Runs experiment for test purposes (without calibration and recording) ([F9])
Global Settings	Opens the Global Settings 17 dialog
Subject Property Editor	Opens the Subject Properties 51 dialog.

? (Help) menu	Function
Help	Opens the Online Help ([F1])
About	Shows information about Experiment Center 2.3

7.4 Keys Overview

Several functions of Experiment Center 2.3 can be executed using keyboard commands. The following tables give you an overview.

Keyboard commands while editing an experiment

Press […] key	to …
[CTRL] + [N]	create a new experiment.
[CTRL] + [O]	open an experiment.
[CTRL] + [S]	save the experiment.
[DEL]	delete a selected stimulus element from the list of stimuli.
[CTRL] + [C]	insert a new calibration element.
[CTRL] + [T]	insert a new text stimulus.
[CTRL] + [I]	insert a new image stimulus.
[CTRL] + [W]	insert a new web stimulus.
[CTRL] + [M]	insert a new movie stimulus.
[CTRL] + [R]	insert a new screen recording stimulus.
[UP] / [DOWN]	move the cursor in the list of stimuli up and down.
[TAB]	change the focus to the next screen control.
[SHIFT] + [TAB]	change the focus to the previous screen control.
[F8]	switch the stimulus monitor.
[F9]	execute a dry run.
[F10]	start the experiment.
[F1]	open help.
[F12]	Switch to fullscreen mode in text editor (text stimulus)

Keyboard commands during calibration

Press […] key	to …

[SPACE]	accept target fixation during calibration. The next stimulus will be presented to the subject.
[>]	accept target fixation during calibration. The next stimulus will be presented to the subject.
[F11]	end the calibration and proceed to the next stimulus.
[F12]	stop the execution of experiment if calibration is inaccurate.
[<]	repeat calibration.

Keyboard commands while running an experiment

Press […] key	to …
[F11]	end the current stimulus presentation and proceed to the next one.
[F12]	stop the experiment and interrupt the presentation of stimuli (except Web and Screen Recording stimuli).
[SPACE]	to present the next stimulus element to the subject (except Web and Screen Recording stimuli).
[>]	to present the next stimulus element to the subject (except Web and Screen Recording stimuli).
[<]	to present the previous stimulus element to the subject.

You can also select any menu command by pressing the [ALT] key together with the underlined menu hot key. For example the [ALT] + [F] keyboard combination will open the File menu while a subsequent [ALT] + [A] selects the **File**: **Save as...** menu command.

7.5 Text Editor Window

To insert and edit text stimulus elements, Experiment Center 2.3 features a special Text Editor. This editor opens in a new window automatically when you have inserted or selected a text stimulus element in the list of stimuli.

	Open	Opens an existing *.rtf file
	Cut	Cuts the marked text
	Copy	Copies the marked text
	Paste	Pastes a cut or copied text
	Undo	Undoes the last step
	Redo	Redoes the last step
[Font]	Font selection	Changes the font family of the currently marked text.
[Size]	Size selection	Changes the font size of the currently marked text.
[bold]		Formats marked text bold. A repeated click on the button cancels the formatting.
[Italic]		Formats marked text italic. A repeated click on the button cancels the formatting.
[Underline]		Underlines marked text. A repeated click on the button cancels the formatting.
	Bullets	Adds bullets to the selected paragraph. A repeated click on the button cancels the formatting.

	Numbering	Numbers the selected paragraph. After a line break the next paragraph will be numbered consecutively. A repeated click on the button cancels the formatting.
	Align left	Formats the selected paragraph left-aligned
	Align Center	Centers the selected paragraph
	Align Right	Formats the selected paragraph right-aligned
	Align Justify	Justifies the selected paragraph
	Increase indent	Increases the left indent of the selected paragraph
	Decrease indent	Decreases the left indent of the selected paragraph
[Color]	text color	Sets the color of the text

Data Storage

Chapter

8 Data Storage

8.1 Data Storage Structure

Data Collection

A data collection consists of one or several measurement data files, a number of stimulus images and some additional information you have to provide. We call this collection an ”experiment”. In an Experiment Center 2.3 experiment, the assembled measurement data files are called ”trials”.

Experiment Structure

In a typical gaze tracking experiment, the stimulus changes over time. In order to synchronize the measurement data with changes in stimulus presentation, the data files contain either a ”set number” or a ”user message” at the onset time of the stimulus change. This synchronizing information can be used to separate each trial into ”sets”, where each set is associated with a certain stimulus image.

8.1.1 Directory Structure

All accumulating data in a gaze tracking experiment will be saved automatically by Experiment Center 2.3. They are saved in two different directories created under the configured data path (see Global Settings 17).

For each experiment, Experiment Center 2.3 creates two subdirectories to store experiment data:

- Experiments: this directory contains the experiment file (*.EXP) as well as used media such as *.RTF, *.BMP, etc. By default, this directory resides under the program installation directory:
  C:\Program Files\SMI\Experiment Suite 360\Experiment Center 2

\Experiments\[Experiment Name].

- Results: this directory contains the experiment results files (*.IDF). The IDF files are written by the iView X system which responds to the respective commands Experiment Center 2.3 sends during runtime. By default, this directory resides under the program installation directory:
  C:\Program Files\SMI\Experiment Suite 360\Experiment Center 2 \Results\[Experiment Name].

With a double PC setup, both directories need to be located on a network share writeable from both PCs.

8.1.2 Importing and Exporting Experiments

If you created an experiment on one PC, you may need to transfer the experiment to another PC system also running Experiment Center 2.3. Because all relevant files for an experiment are stored in a single folder, it is easy to transfer the experiment using the standard folder copy function of the Microsoft Windows operating system:

1. Start Windows Explorer. Open the Windows **Start** menu and select the **All Programs**: **Accessories**: **Windows Explorer** menu command.
2. Navigate to the Experiment Center 2.3 program installation folder, for example to **C:\Program Files\SMI\Experiment Suite 360 \Experiment Center 2**. Then navigate the **Experiments** sub-folder.

   Windows Explorer now lists all available experiments in the right contents pane.
3. Select the desired sub-folder and press `[CTRL] + [C]` to copy.
4. Navigate the to destination media, such as an USB stick or a network share. Press `[CTRL] + [V]` to paste the sub-folder to the destination media.

   You may transfer the media to the destination PC and copy the sub-folder to the Experiments folder of the local Experiment Center 2.3

installation.

5. On the destination PC, load the copied experiment (see Loading and Changing an Experiment 29).

To transfer an experiment via online media or e-mail, it is best to pack and unpack the folder using an archival tool such as WinZip.

Do not rename the folder while copying it. The folder's name is the name of the experiment - which needs to match the file name of the included *.exp and *.mtd files.

8.2 Experiment Files

All files used to create an experiment are stored in a subdirectory under the current **Experiment Path** setting (see Global Settings 17). This subdirectory is created when saving the experiment.

The contents of the experiments subdirectory are:

- An *.exp file including the experiment description, the experiment specific settings, as well as all used stimuli with their properties.
- All source files used as stimuli.

Example:

In the following example, the operator entered ”slideshow” at the experiment saving prompt.

...\experiments\slideshow\

slideshow.exp
textfile.rtf
moviefile.avi
imagefile.bmp

8.3 Results Files

All files used to execute an experiment are stored in a subdirectory under the current **Results Path** setting (see Global Settings 17). This subdirectory is created when recording the experiment.

The contents of the results subdirectory are:

- Several *.idf files which contain the measured gaze tracking data – one for each subject. The *.idf file has the following naming convention:

  <subject name>-<experiment name>-<trial number>.idf

- A protocol text file for each subject with the following naming convention:

  <subject name>-<experiment name>-<trial number>.txt

- Files containing the rendered visual stimuli for analyzing the experiment with the BeGaze 2.3 software. The file names of these files are also used as trial separations in the *.idf file.

- Files containing experiment workflow, subject property information and automatic generated AOI information.

IDF file recording, screen shots and video recording start after a successful calibration. For this reason, the files stored in the results folder do not include the calibration.

Rendered stimuli reference

The presented text and image stimuli are stored as rendered single bitmap files based on screenshots during experiment execution. The naming convention is:

Text:	**text<increasing number>.jpg**
Image:	**<original filename>.jpg**

Web stimuli are stored as a single bitmap of each presented web site (represented by an unique URL). The naming convention is:

Web: **<URL with replaced special characters>.jpg**

Movies will be copied from the experiment's to the result's directory. The naming convention is:

Movie: **<original filename>.avi**

Screen recording stimuli will record screenshots written to an avi file. The naming convention is:

Screen Recording: **<filename>-<subjectname>-<trial number>.avi**

Example:

In the following example, the operator entered "slideshow " at the experiment saving prompt.

\results\slideshow\

subjectname-slideshow-1.idf
subjectname-slideshow-1.txt
textfile1.jpg
imagefile1.jpg
moviefile1.avi
filename-slideshow-1.avi

8.4 Supported File Formats

Experiment Center 2.3 supports different file formats. While the Experiment Center 2.3 files and the gaze tracking data are specific to SMI software, all media components presented as stimuli are generally supported by the underlying Windows operating system and the Windows Media Player. For this reason, it is possible to use third party tools and software to create or change media files which are used as stimulus, provided that the following file formats are supported:

Text Media

All text media are stored as RTF (Rich Text Format). Experiment Center 2.3 supports a subset of the RTF file format specification, which includes basic font attribution, font size, alignment, and indenting and list formats.

It is possible to import ASCII text with the text editing component. To use a more complex file as stimulus, for example a file created with Microsoft Word, you may filter the file by copying and pasting the contents via the Windows clipboard.

Image Media

For image media, the following file formats are supported:

- BMP: an older file format supported on all Windows versions; has different color depth variants, such as black & white, 16 colors, 256 colors, and true color
- JPG: preferred for photographic images; true color model only; saves disk space but may show compression artifacts if repeatedly opened, changed and saved.
- PNG: a newer compressed and lossless image format; has a 256 color and a true color variant

For optimal display, the image file should have the same dimensions and color depth as the display resolution used for the subject's monitor. Although it is possible to scale the image media during presentation, this may produce unwanted raster image scaling artifacts.

All of the above image file formats are supported by common image editing software. If no conversion is available, you can copy the raster image to the Windows clipboard, then paste the image into the Windows Paint accessory. Then you can save it to a disk file from there.

Web Media

A typical web site consists of HTML and embedded media. The desired web site presented as stimulus needs to be displayed correctly in the installed Internet Explorer version.

Movie Media

Experiment Center 2.3 supports the same audiovisual media file formats as the installed Microsoft Media Player. This includes AVI (Audio Video Interleaved), a matured container file format supported on all windows versions.

However, all movie file formats are denoted as ”container formats” because they can include various media using specific data formats. To decode and display the video material inside the container file, you need the corresponding codec installed on the PC. To verify the audio and video format, right click the desired file in Windows Explorer or in the **Select Movie** dialog. Select the **Properties** context menu command, switch to the **Summary** tab, then click the **Expand** button.

The list of installed video codecs is a bit hard to find. With Windows XP you can open the Control Panel. Then open the Sounds and Audio Devices applet, navigate to the Hardware tab, select Video Codecs in the list, then click the Properties button. With Windows Vista, start the pre-installed Windows Media Player 10, select the Help: Info menu command, then click the Technical Support link.

Screen Recording Media

All screen video material captured during experiments is saved to hard disk in the AVI file format. The screen recording of Experiment Center 2.3 uses the customized Xvid Solutions MPEG-4 codec (XMP-4) installed during Experiment Center 2.3 setup. The XMP-4 codec is compatible to standard Xvid and DivX codecs for playback.

All screenshots taken during the stimulus presentation are saved to hard disk in the jpg file format (see above 83).

Appendix

Chapter

9 Appendix

9.1 Limitations / Setup recommendations

The performance requirements vary based on the type of stimuli, complexity of the experiment and the connected iView X eye tracking system.

Therefore not all type of experiments can be executed in a One-PC-setup, where iView X and Experiment Center are running on the same PC. For highest performance and best data quality a dual-PC-setup is recommended.

The following table is showing the dependencies and setup requirements for the available stimuli types.

System Setup conditions:

- iView X frame drops: < 1%
- Online preview refresh rate (of background image): 1fps
- Webcam: not connected

System Setup*		One PC Setup (Dual Monitor)			Dual PC Setup
	iView X interface	RED	RED	Hi-Speed	Hi-Speed, MRI, RED, MEG, Primate
	iView X PC	iView X Laptop Modell 8410/8420 (Core-Duo)	iView X Cube (Quad-Core)	iView X Tower** (Core-Duo)	iView X PC (Laptop, Tower or Cube PC) and Stimulus PC (Mid/High - end)
Calibration		yes	yes	yes	yes
Images		yes	yes	yes	yes
Text		yes	yes	yes	yes
Movie	fit to screen = no	yes	yes	no	yes
Movie	fit to screen = yes	no with 8410	yes	no	yes
		yes with 8420	yes	no	yes
Web	without Screenrecording	yes	yes	no	yes
Web	with Screenrecording	no	yes	no	yes
Screenrecording	<= 10fps	no	yes	no	yes
Screenrecording	> 10fps	no	no	no	yes
* Conditions: Exp.Center Online Preview = 1fps / iView X frame drops < 1% / without Webcam					
** modified with Nvidea GeForce 9600 GT graphic card / without Webcam					

System Setup conditions:

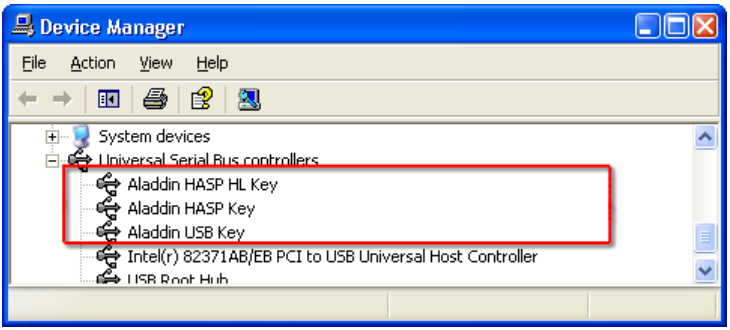
- iView X frame drops: < 1%
- Online preview refresh rate (of background image): 1fps
- Webcam: connected

System Setup*		One PC Setup (Dual Monitor)			Dual PC Setup
	iView X interface	RED	RED	Hi-Speed	Hi-Speed, MRI, RED, MEG, Primate
	iView X PC	iView X Laptop Modell 8410/8420 (Core-Duo)	iView X Cube (Quad-Core)	iView X Tower** (Core-Duo)	iView X PC (Laptop, Tower or Cube PC) and Stimulus PC (Mid/High - end)
Calibration		yes	yes	no	yes
Images		yes	yes	no	yes
Text		yes	yes	no	yes
Movie	fit to screen = no	yes	yes	no	yes
Movie	fit to screen = yes	no with 8410 yes with 8420	yes yes	no no	yes yes
Web	without Screenrecording	yes	yes	no	yes
Web	with Screenrecording	no	yes	no	yes
Screenrecording	<= 10fps	no	yes	no	yes
Screenrecording	> 10fps	no	no	no	yes
* Conditions: Exp.Center Online Preview = 1fps / iView X frame drops < 1% / with Webcam					
** modified with Nvidea GeForce 9600 GT graphic card /with webcam					

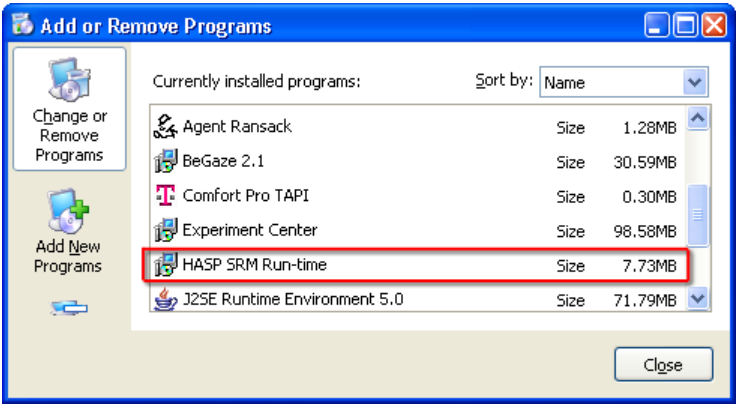
9.2 Dongle Installation and Troubleshooting

Experiment Center 2.3 is dongle-protected. You may have to place the USB-dongle in the appropriate PC before you can start the program. If Experiment Center 2.3 displays a message box stating **HASP SRM Protection System**: **The software requires a hardware key (dongle)**, check the following:

1. The activity LED of the USB-dongle should show a red light if the dongle is plugged in.
2. If the activity LED does not show a red light, check the USB port status in the Windows hardware settings dialog. Open the Windows **Control Panel** and double click the **System** icon. Switch to the **Hardware** tab and click on the **Device Manager** button. Verify, that the **Universal Serial Bus controllers** tree does not show any yellow warning signs ( ). The screen shot below shows a functional USB port with a correct Windows driver installation.



   If the dialog displays a warning sign ( ) for a driver, right click the entry and select the **Update Driver...** command from the context menu.
3. Verify, that the dongle driver is installed properly. Open the Windows **Control Panel** and double click the **Add or Remove Programs** icon. Check if the list shows the **HASP SRM Run-time** entry.



Note, that the **HASP SRM Run-time** is installed during the installation of Experiment Center 2.3. Do not deny the installation of this software during installation when prompted.

Type and status of your licenses are stored on the dongle device, not on the PC on which Experiment Center 2.3 is installed. With the license update procedure, the dongle is updated. That means, that you can run Experiment Center 2.3 on any PC when the dongle is plugged in.

9.3 Information on Calibration

Calibration is the process where the iView X system establishes the relationship between the position of the eye in the camera view and a gaze point in space, the so-called point of regard (POR). The calibration also establishes the plane in space where eye movements are rendered. Since this relationship strongly depends on the overall system setup and also varies between subjects, a reference measurement called calibration must be performed before each experimental trial.

During calibration, the subject is presented with a number of targets in known locations. These targets must be fixated on by the subject and the position of the eye is noted by the system. Using these reference points,

the system creates a mapping function that relates all eye positions to points in the calibration area (monitor).

The accuracy of gaze data is directly related to the success of the calibration.

For more information on calibration, please refer to the iView X Online Help.

9.4 Information on User camera and Audio Recording

The observation package license is needed to record user video and user audio.

SMI delivers a selected and verified Webcam with the observation package to ensure best results (video resolution, dropped frames, delay).

The recording of a video and audio can be switched on and off in the global settings 17 dialog.

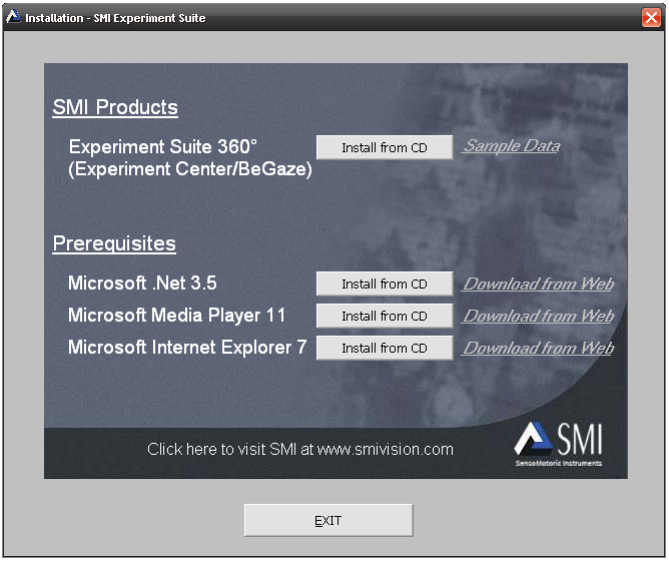
There are two modes available:

- Video recording only
- Video recording and audio recording

Although the delivered webcam is "hand-selected" and no delay could be observed with this camera, a 100% synchronized recording of the user video to the presented stimuli cannot be guaranteed. The recoding delay is influenced by the experiment performance requirements, the webcam driver, the USB chipset, the number of used devices on the USB interfaces and the Microsoft DirectShow interface which are all under control of the MS Windows XP/Vista operating system and can only be influenced up to a certain level.

9.5 Program Installation

The product installation media (CD-Rom) offers suitable software packages to install. Please run the auto-start application from the installation medium and click on the respective buttons to install necessary software.



The Experiment Suite 360° includes the Experiment Center 2.3 as well as the BeGaze 2.3 software. To install the Experiment Suite 360°, proceed as follows:

1. Insert the installation media (CD-Rom).

   The auto-start application opens.

2. Click on the **Install from CD** button.

   Follow the steps of the installation wizard.

While installing the Experiment Suite 360°, the USB dongle driver (HASP SRM Run-time) is installed or updated. You may need to update the USB dongle license information. Refer to the BeGaze 2.3 manual under "Dongle Protection and License Update" for details.

The Microsoft .NET Framework, the Microsoft Internet Explorer, and the Microsoft Media Player software components are available from the Experiment Center 2.3 installation media. These software components are also available from the Microsoft web site where you can download them for installation to the desired PC workstation. Both software components will inspect your PC workstation during installation and may issue warning messages if the PC resources do not meet the necessary performance.

Please use always the latest versions that are available for download from the Microsoft web site.

9.6 System Requirements

You can install and run Experiment Center 2.3 on a standard PC workstation running the Microsoft Windows operating system if the following requirements are met.

- Experiment Center 2.3 is based on the Microsoft .NET Framework Version 3.5 Service Pack 2 or above. This in turn requires the Microsoft Windows XP operating system with Service Pack 2 or the Microsoft Windows Vista operating system.
- The PC and Windows OS must be compatible with European or American keyboard and language settings. Asian language settings (e.g. Chinese) are not supported.
- The PC workstation performance should be sufficient to display or play the different media types presented during Experiment Center 2.3 execution. To do so, you need adequate CPU performance combined with enough RAM and hard disk space as well as a 3D accelerated graphics adapter. This should be true for any notebook or desktop

computer bought since 2007. At minimum, you need a 2 GHz Core-Duo Processor, 2 Gb of RAM and at least 10 Gb of free hard disk space. You also need a monitor together with a true color display adapter with a minimum resolution of 1280x1024 pixels to do meaningful experiments.

- You also need the Microsoft Media Player 11 or above and the Microsoft DirectX 9 multimedia runtime or above installed. You may verify the media performance by test playing a DVD film or something similar.
- If you run Experiment Center 2.3 on the same PC workstation as the iView X gaze tracking system, keep in mind that during an experiment the CPU will need spare resources to examine and calculate the incoming gaze tracking data. In case you want to do experiments with different monitors for subject and operator, you also need a display adapter capable of driving a secondary display such as a notebook computer with an additional display jack.
- If you run Experiment Center 2.3 on a separate PC workstation, you need at least a 100 Mbit Ethernet interface adapter to connect with the PC workstation running the iView X gaze tracking system.

Note, that iView X version 2.3.x or higher is required to run Experiment Center 2.3. If you try to connect to an incompatible version of iView X, Experiment Center 2.3 displays a corresponding message box and terminates. You need to update your iView X software in this case.

9.7 Troubleshooting

This chapter explains some warnings and error messages that might occur and describes what the user should do in these cases.

Video Playback

If you experience problems during video playback, examine the Media

Player's **Help**: **Troubleshooting** menu command as well as the Media Player's **Tools**: **Options**: **Performance** dialog tab. You may also run the DirectX diagnosis tool to verify the PC's capabilities. From the Windows **Start** menu, select the **Run** command, type in ”dxdiag”, then confirm with **OK**.

System Performance

Certain background processes and services require substantial system resources during execution. While this does not affect the system during idle times, those background processes may disturb a running gaze tracking experiment. If you notice a degradation in system responsiveness, you may consider the following points:

- Disable the background scan function of your virus scanner. This function scans newly started executables and various file formats while they are read in from the hard disk drive. Use the on-demand virus scan function instead.
- Make sure that no CPU consuming screen saver is automatically activated during a running experiment. It is best to completely switch off the screen saver during an experiment.
- You may also deactivate any auto-update functions. While background downloading of files does not normally use too much system resources, confirmation dialogs and update notices may disturb an experiment.
- Also check the power configuration of a notebook PC. In the Windows **Control Panel**, select the **Performance and Maintenance** category. Start the **Power Options** applet and select the ”Presentation” entry in the **Power Schemes** list.

Please verify that your system setup as well as the experiment setup is matching our recommendations (see also: System Requirements) 93.

Error message: ”Cannot reset the Red”

If a message appears: ”cannot reset the RED”, check the following:

1. The Illumination Controller RED (e-box) should be switched on.
2. Reset the camera by switching the e-box off and on.
3. Check to ensure that no other program is using the camera (e.g. the Smartview program).
4. If it still does not help, reinstall the 1394 (firewire) driver.

Experiment Center 2.3 does not start

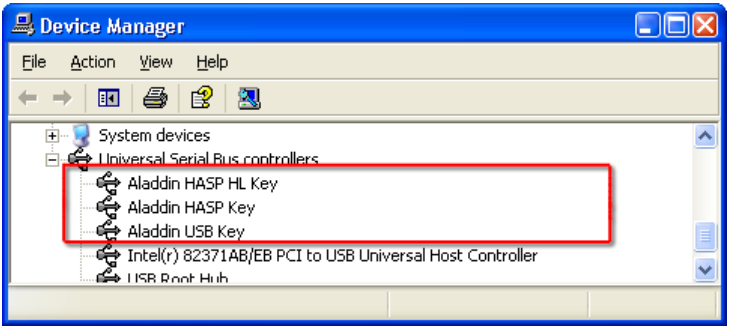
It is not sufficient, to simply copy the Experiment Center 2.3 program directory to another PC. Please use the Experiment Center 2.3 installer. This ensures for example, that required Microsoft .NET Framework Version 3.5 (SP1) or above is installed properly. Note that you cannot start Experiment Center 2.3 from a network share / network drive because of .NET security restrictions.

Dongle protection

Experiment Center 2.3 and BeGaze 2.3 are both dongle-protected and share the same dongle. If both programs run on different PCs, you may have to place the USB-dongle in the appropriate PC before you can start the program.

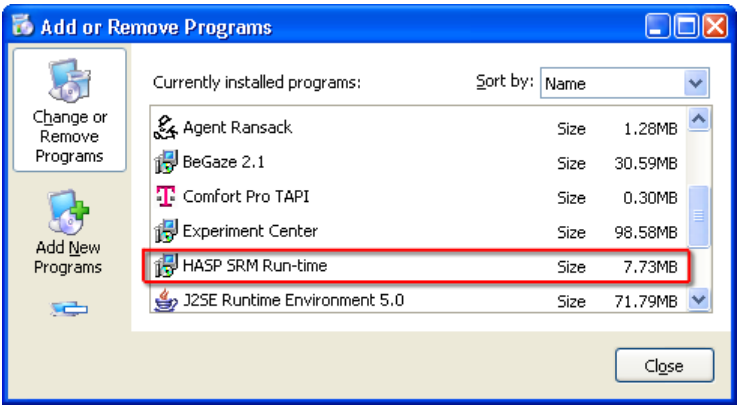
If Experiment Center 2.3 displays a message box stating **HASP SRM Protection System**: **The software requires a hardware key (dongle)**, check the following:

1. The activity LED of the USB-dongle should show a red light if the dongle is plugged in.
2. If the activity LED does not show a red light, check the USB port status in the Windows hardware settings dialog. Open the Windows **Control Panel** and double click the **System** icon. Switch to the **Hardware** tab and click on the **Device Manager** button. Verify, that the **Universal Serial Bus controllers** tree does not show any yellow warning signs ( ). The screen shot below shows a functional USB port with a correct Windows driver installation.



If the dialog displays a warning sign (!) for a driver, right click the entry and select the **Update Driver...** command from the context menu.

3. Verify, that the dongle driver is installed properly. Open the Windows **Control Panel** and double click the **Add or Remove Programs** icon. Check if the list shows the **HASP SRM Run-time** entry.



Note, that the **HASP SRM Run-time** is installed during the installation of Experiment Center 2.3. Do not deny the installation of this software during installation when prompted.

9.8 Turn off Hardware accelaration

It might be that you want to turn Off Hardware Acceleration to improve video quality or to allow screen recording of applications that are running in the graphics memory (e.g MS Media player).

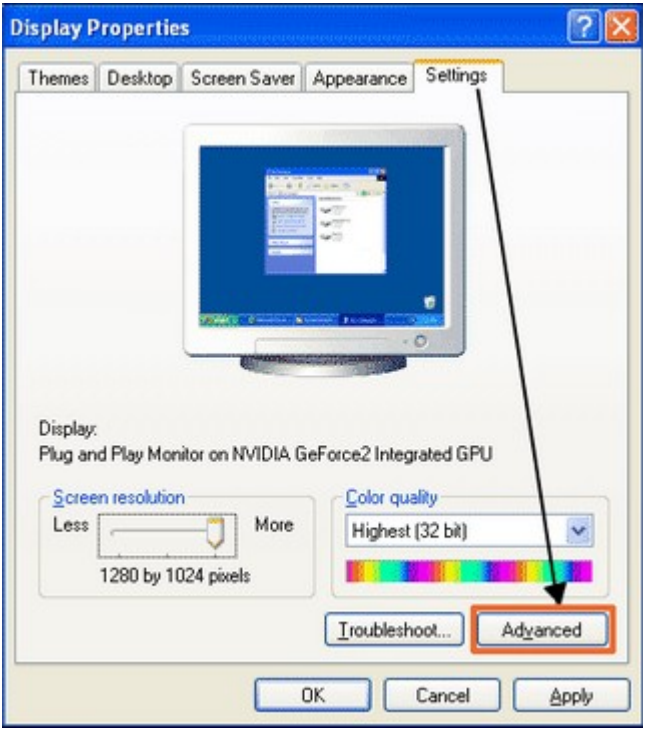
Turning off the hardware acceleration system wide in Windows XP

You can turn off hardware acceleration completely or turn it down system wide in the following manner:

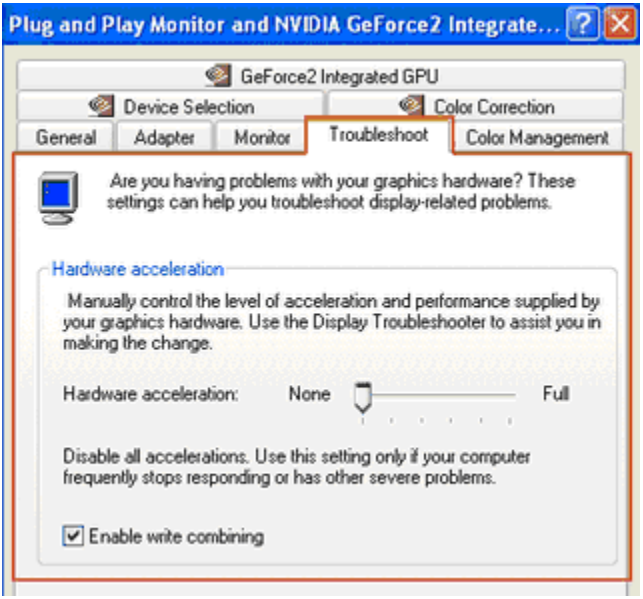
1. Click on Start -> Control Panel.

2. In the classic view, double click on the Display icon.

3. Select the Settings tab and click on the Advanced button. The Advanced Settings dialog box appears.



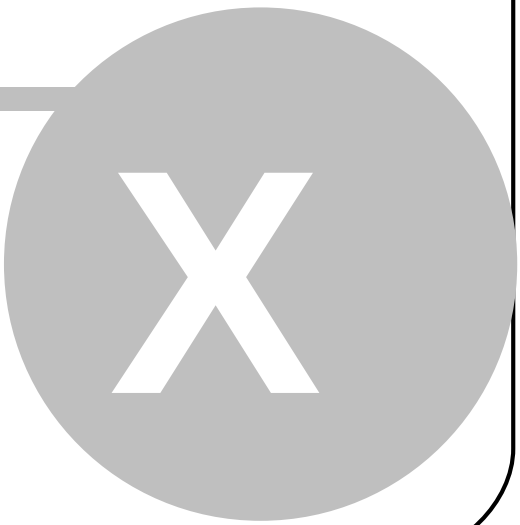
4. Windows Settings Tab Click on the Troubleshoot tab.



5. You can disable the hardware acceleration completely by dragging the slider to the extreme left of the scale. You can also choose to turn down the hardware acceleration by selecting an intermediate value.

Copyright and Trademarks

Chapter



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Chapter

11 License Agreement and Warranty

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Teltow, Germany, 2004-2009
SensoMotoric Instruments GmbH

About SMI

Chapter

12 About SMI

SensoMotoric Instruments® (SMI) was founded in 1991 by a group of research scientists, physicians, and engineers in order to pursue the commercial development of measurement and evaluation systems in the field of medicine, psychology, ergonomics, human factors, and virtual reality. SMI specializes in development and system integration in the field of video and sensor technology, associated with digital image and signal processing. In 1992, SMI was awarded the Innovation Prize of Berlin-Brandenburg for VOG - Video-Oculography, its video-based eye movement technology.

This technology has found widespread use in the medical diagnosis and research of eye movement, psychology research as well as in specific research applications, for example on the space station MIR. For further development SMI collaborates with leading clinical and research laboratories and partners around the world.

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Last updated: May 2009

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